# Chapter Three
# Core Syllabus: Knowledge of Patient Care

## INTRODUCTION

The General Pediatric Patient Care Core Syllabus is an extensive outline presenting the knowledge or content that should comprise training and that should be maintained during the career of a general pediatrician in order to provide comptent **patient care** to children. The Syllabus is organized by broad content areas: some are organ-based, others are disease-based, and some are science-based. The Syllabus, like the other documents comprising the Global Curriculum, is a living document that will constantly evolve as the science of medicine and our understanding of pediatrics evolves. Please refer to the Global Pediatrics website (www.globalpediatrics.org) for the most recent version of this document.

Faculty and trainers are encouraged to use this document as a guide for developing a training curriculum in the local environment. We have attempted to delineate the content of the Syllabus so that it is applicable to training programs regardless of geographic or political boundaries. The listing of patient care knowledge contained herein is by no means exhaustive; rather, it contains the "core" or essential areas that we believe should be mastered during training in order to be a competent general pediatrician. We encourage trainers and trainees to refer to comprehensive texts to implement and augment this outline (See *Recommended Additional Resources*).

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Nelson Textbook of Pediatrics (19th Edition)
www.nelsonpediatrics.com

World Health Organization: Pocket Book of Hospital Care for Children (2005)
http://whqlibdoc.who.int/publications/2005/9241546700.pdf

Worth Health Organization: Growth Reference Data for 5-19 Years
http://www.who.int/growthref/en/

# *Allergy*

| **General**<br>By the end of training a resident should: | |
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| History | Understand that allergy is a mechanism of disease and not a disease<br>Know that allergy refers to immunopathologic mechanisms of tissue damage<br>Know the four distinct allergy mechanisms (ie, Gell and Coombs classification)<br>Be able to:<br>Recognize factors in the presentation which suggest underlying or serious pathology |
| Physical | Be able to:<br>Recognize the life threatening nature of some allergic conditions |
| Diagnosis | |
| Management | Be able to:<br>Assess and initiate management of patients presenting with allergic problems in acute and outpatient settings<br>Undertake long term management of allergic conditions<br>Take into account in the management of all cases of allergy the following factors: epidemiology; prevention; nutrition; relation to environmental exposure; and influence of genetics on development of allergy<br>Effectively collaborate with family, health team, and specialists regarding allergy issues<br>Refer to specialists as appropriate |

| **Allergic rhinitis**<br>By the end of training a resident should: | |
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| History | Know that allergic rhinitis is caused by a Type I allergic response to a wind borne allergen, dust mite allergen, pet dander, and/or mold spores<br>Know the common characteristics of allergic rhinitis (eg, stuffy nose; chronic recurrent sneezing; pruritus of the |

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| | nose, eyes, soft palate, and ears; runny nose; repeated throat clearing; snoring)<br>Understand the association between allergic rhinitis and sinusitis with otitis media, asthma, urticaria, and eczema<br>Know that perennial allergic rhinitis is usually caused by indoor allergens such as dust mites and animal danders<br>Be able to:<br>Determine if symptoms are seasonal, perennial, or episodic<br>Determine if there are any exacerbating factors (eg, pollen, dust, animals, cigarette smoke, molds)<br>Determine if there is a family history of atopic disease that supports a diagnosis of allergic rhinitis |
| Physical | Be able to:<br>Identify the physical signs of allergic rhinitis:<br>Identify the presence of "allergic shiners", ie, discoloration beneath eyes<br>Identify the presence of Dennie-Morgan lines<br>Identify the presence of an "allergic salute," ie, patient rubs nose with the palm of hand upward<br>Identify the presence of a transverse crease near the tip of the nose and/or edema in nasal mucosa<br>Identify the presence of geographic tongue<br>Identify the presence of abnormalities on palpebral conjunctiva |
| Diagnosis | Know that skin testing is appropriate in evaluating allergic rhinitis<br>Know that results of skin testing can be inaccurate if the patient is taking antihistamines at the time of skin testing<br>Know that in vitro testing is indicated when antihistamines cannot be stopped, when dermatographism is present, when severe anaphylaxis has occurred to the proposed testing agent<br>Be able to:<br>Formulate a diagnosis based upon history and physical findings<br>Distinguish between allergic rhinitis and non-allergic rhinitis by history and physical examination |

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| | Identify the presence of nasal discharge |
| Management | Know that immunotherapy is most effective in treating allergic rhinitis<br>Be able to:<br>Initiate the treatment of allergic rhinitis to include allergen avoidance<br>Initiate treatment with appropriate medications (eg, antihistamines and intranasal corticosteroids)<br>Treat the side effects of immunotherapy injections<br>Refer to a specialist as appropriate |

**Asthma (**see ***Respiratory***)

**Atopic dermatitis/eczema: (**see ***Dermatology***)

| **Urticaria, angioedema, anaphylaxis**<br>By the end of training a resident should: | |
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| History | Know the etiologic agents that commonly cause urticaria/angioedema/anaphylaxis<br>Know that chronic urticaria does not warrant allergy testing |
| Physical | Be able to:<br>Recognize the signs and symptoms of anaphylaxis including generalized urticaria, breathing difficulties with inspiratory stridor, laryngeal edema, wheezing, hoarseness, dysphonia, difficulty swallowing, abdominal pain, diarrhea, hypotension and vascular collapse |
| Diagnosis | Be able to:<br>Distinguish among urticaria, angioedema and anaphylaxis |
| Management | Be able to:<br>Coordinate immediate and effective treatment for anaphylaxis, including epinephrine |

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| | Effectively coordinate advanced life support when necessary<br>Plan effective treatment of chronic urticaria<br>Advise on the future risk of anaphylaxis and facilitate an appropriate anaphylaxis treatment and prevention care plan by collaborating with the child, parents, and community<br>Advise on the appropriate use of epinephrine (adrenalin) |

| **Adverse reactions**<br>By the end of training a resident should: | |
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| General | |
| History | Know the etiologic agents that commonly cause anaphylaxis |
| Physical | Be able to:<br>Recognize the signs and symptoms of anaphylaxis |
| Diagnosis | (See **Anaphylaxis)** |
| Management | Be able to:<br>Plan effective treatment for adverse reactions<br>Coordinate advanced life support when necessary<br>Effectively collaborate with the family and health care team in the treatment of adverse reactions |
| Food | |
| History | Know the foods that commonly cause allergic reactions (eg, milk, soy, eggs, peanuts, seafood, wheat, tree nuts)<br>Know that some patients with moderate or severe eczema, and positive skin tests to food, may or may not have acute symptoms with ingesting these foods, and may experience improvement in their eczema after eliminating these foods<br>Know that more than 90% of food-allergic individuals demonstrate allergic responses to only 1 or 2 foods<br>Know that most milk, egg, and soy allergies are outgrown by 5 years of age |

## *Allergy*

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| | Know that most allergies to peanuts, tree nuts, and seafood are not outgrown in early childhood<br>Know the foods that can trigger IgE mediated reactions<br>Understand the mechanisms of IgE and non-IgE food allergy and food intolerance due to enzyme deficiencies<br>Be able to:<br>Elicit likely allergens responsible for symptoms via a thorough history |
| Physical | Be able to:<br>Recognize the physical signs of food allergy |
| Diagnosis | Know available tests for food allergy and their limitations<br>Know that RAST testing correlates closely with results of skin tests<br>NOTE: See also diagnosis section on allergic rhinitis<br>Be able to:<br>Evaluate a patient with eczema and food allergies |
| Management | Be able to:<br>Manage the features of cows milk protein intolerance<br>Distinguish allergy from intolerance and be able to explain to parents<br>Refer to a specialist as appropriate |
| Drugs | |
| History | Know that penicillin is the most common cause of serious allergic drug reactions in childhood |
| Physical | Be able to:<br>Recognize the various hypersensitivity reactions that penicillin allergy may manifest and know that reactions may be systemic (eg, anaphylaxis), hematologic (eg, hemolytic anemia) and renal (eg, interstitial nephritis) |
| Diagnosis | Know which in vivo skin tests to use when diagnosing penicillin allergy<br>Be able to: |

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| | Diagnose penicillin allergy based upon history and physical exam |
| Management | Be able to:<br>Coordinate treatment of anaphylaxis<br>Recommend the discontinuation of penicillin as appropriate<br>Provide preventive counseling on avoidance<br>Refer to a specialist appropriately |
| Contrast media | |
| History | Know signs of adverse reaction to contrast media<br>Know that adverse reactions to contrast media are not IgE-mediated |
| Physical | Be able to:<br>Recognize the physical signs of adverse reaction to contrast media |
| Diagnosis | Be able to:<br>Formulate the differential diagnosis involving reaction to contrast media |
| Management | Know that adverse reactions to contrast media can be prevented by pre-treatment with corticosteroids and antihistamines<br>Be able to:<br>Appropriately treat an adverse reaction to contrast media |
| Vaccines | |
| History | Know that vaccine components can be associated with allergic reactions |
| Physical | Be able to:<br>Recognize common symptoms associated with allergic reactions to vaccines |
| Diagnosis | Be able to:<br>Formulate a diagnosis when an allergic reaction appears to be vaccine-related (information from the history |

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| | is most important) |
| Management | Be able to:<br>Appropriately treat an allergic reaction to a vaccine<br>Consult with a specialist regarding an allergic reaction to a vaccine as appropriate |
| Insect stings and bites **(**see also *Urticaria and Anaphylaxis* in this section**)** | |
| History | Know that allergic reactions to insect stings/bites cause significant morbidity and may manifest with anaphylaxis<br>Know that insect sting/bite reactions may manifest immediately (ie, within minutes or hours) or be delayed (ie,for up to 6 days) |
| Physical | Be able to:<br>Identify immediate reactions such as localized swelling, transient pain, and erythema<br>Identify systemic symptoms and signs such as urticaria, flushing, angioedema, and/or anaphylaxis<br>Identify delayed reactions that manifest with serum sickness-like reactions (eg, myocarditis, transverse myelitis and nephritis ) |
| Diagnosis | Be able to:<br>Diagnose insect sting/bite utilizing information from the history and physical examination |
| Management | Be able to:<br>Provide immediate treatment for systemic reactions<br>Prescribe corticosteroids when indicated for severe local reactions<br>Provide treatment of non-severe local reactions (ie, removal of stinger, applying cold compresses, providing oral antihistamines and analgesics)<br>Recommend prevention strategies (eg, exterminating insect infested areas and avoidance of bright colored clothing)<br>Refer to a specialist appropriately |

## *Cardiology*

| **General**<br>By the end of training a resident should: | |
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| History | Understand the age-dependent cardiac symptoms of children<br>Know the possible cardiac complications of other system disorders<br>Know the genetic and environmental factors in the etiology of congenital heart disease<br>Be able to:<br>Recognize the life threatening nature of some of cardiac conditions and when to call for help |
| Physical | Be able to:<br>Identify the clinical manifestations of congestive heart failure<br>Identify the extent of cyanosis<br>Identify the abnormal heart sounds and the heart murmurs |
| Diagnosis | Be able to:<br>Use echocardiography when appropriate<br>Formulate a differential diagnosis<br>Select and interpret appropriate cardiologic investigations<br>Identify common ECG abnormalities |
| Management | Be able to:<br>Refer for specialist pediatric cardiology assessment for further management<br>Assess and initiate management of babies and children presenting with cardiologic disorders<br>Respond appropriately to cardiac arrest |

| **Symptoms**<br>By the end of training a trainee should: |
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| Hypertension (See also ***Nephrology***) |

## *Cardiology*

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| History | Know prescription, over-the-counter, and illicit drugs likely to elevate the blood pressure<br>Know that coarctation of the aorta causes upper extremity hypertension |
| Physical | |
| Diagnosis | Be able to:<br>Diagnose hypertension appropriately (eg, use age-specific blood pressure tables, appropriate cuff size, and repeated measurements) |
| Management | Be able to:<br>Treat uncomplicated hypertension |
| Chest pain | |
| History | Know that chest pain in healthy children is generally not cardiopulmonary in origin<br>Know the importance of cardiovascular evaluation in patients with chest pain associated with exercise<br>Understand the cardiovascular causes of chest pain |
| Physical | Be able to:<br>Recognize the abnormal respiratory sounds of the pneumothorax<br>Identify skin lesions and tenderness of the chest wall |
| Diagnosis | Be able to:<br>Identify the pneumothorax on the chest X-ray<br>Identify the abnormal ST-T changes on the ECG |
| Management | Be able to:<br>Explain chest pain to parents when there is in no origin of cardiopulmonary disease<br>Provide appropriate counseling for patients with chest pain |
| Syncope | |
| History | Know and recognize the cardiac causes of syncope |

## *Cardiology*

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| | Know the importance of cardiovascular evaluation in patients with syncopal or pre-syncopal episodes with exercise |
| Physical | Understand that the description of a syncopal episode usually directs the evaluation |
| Diagnosis | Be able to:<br>Initiate appropriate investigations including appropriate ECG analysis<br>Differentiate syncope from seizures<br>Use orthostatic test when appropriate for making the diagnosis |
| Management | Be able to:<br>Assess and initiate management of orthostatic dysregulation<br>Provide appropriate counseling for patients with non cardiovascular syncope<br>Refer to pediatric cardiologist and/or neurologist for further management as appropriate |
| Murmur | |
| History | Know the etiology of common heart murmurs and their hemodynamic implications<br>Know about the effects of heart disease |
| Physical | Be able to:<br>Recognize when a child with an innocent murmur requires no further evaluation |
| Diagnosis | Be able to:<br>Interpret correctly regular heart sounds, additional heart sounds, and heart murmurs<br>Identify an innocent cardiac murmur<br>Use echocardiogram results for cardiac murmur as appropriate |
| Management | Be able to:<br>Advise families appropriately about the effects of heart disease<br>Provide appropriate counseling for innocent heart murmurs |

## *Cardiology*

| Circulatory failure and shock | |
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| History | Understand the clinical features of circulatory failure and shock |
| Physical | Be able to:<br>Recognize and evaluate the clinical signs of circulatory failure and shock |
| Diagnosis | Be able to:<br>Differentiate the clinical features of cardiogenic shock and non-cardiogenic shock<br>Describe the severity of the circulatory failure and shock |
| Management | Be able to:<br>Initiate immediate treatment for the circulatory failure and shock<br>Refer to intensive care teams appropriately |

| **Congestive heart failure**<br>By the end of training a resident should: | |
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| History | Understand the causes of heart failure<br>Understand the hemodynamic characteristics of congenital heart failure in children with large volume left to right shunt<br>Understand the association between systemic arteriovenous malformation and congestive heart failure in a newborn infant<br>Understand the role of the pulmonary vascular bed in the presentation of congestive heart failure in infants with large volume left-to-right shunts<br>Know the common causes of congestive heart failure in infants and children<br>Be able to:<br>Identify features in the history that suggest congestive heart failure in infancy (eg, irritability, dyspnea during feeding, and decreased volume with each feeding in infants)<br>Identify features in the history that suggest congestive cardiac failure in older children (eg, edema, limited |

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| | exercise tolerance) |
| Physical | Be able to:<br>Identify the clinical manifestations of congestive heart failure at all ages (eg, edema, hepatomegaly, jugular vein distention, cardiomegaly, gallop rhythm) |
| Diagnosis | Be able to:<br>Distinguish between body weight gain due to normal growth and that due to fluid retention of congestive heart failure in neonates and infants<br>Identify early fatigue, exercise intolerance, anorexia, and cough as symptoms of congestive heart failure in older children<br>Utilize appropriate imaging study of the chest to help diagnose congestive heart failure |
| Management | Be able to:<br>Work with specialists to plan the treatment of congestive heart failure<br>Refer to a pediatric specialist for management with assistance |

| **Congenital heart disease**<br>By the end of training a resident should: | |
|---|---|
| General | |
| History | Know the epidemiology of congenital heart disease<br>Know that the etiology of most congenital heart diseases is multifactorial in nature |
| Physical | |
| Diagnosis | Understand the increased risk and be able to plan appropriate evaluation of congenital heart disease in a newborn infant with congenital anomalies (eg, trisomy 21, trisomy 18, fetal alcohol syndrome, 22q11 microdeletion, 45,XO) |
| Management | |
| Cyanotic disease | |

## *Cardiology*

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| History | Know the normal fetal circulation and transitional changes after birth<br>Know the anatomy of the common causes of cyanotic heart disease<br>Know the cardiac causes of cyanosis in the newborn infant<br>Know the complications of polycythemia in a patient with cyanotic congenital heart disease<br>Know that a relative anemia can be associated with a stroke in a patient with cyanotic congenital heart disease |
| Physical | Be able to:<br>Recognize cyanosis by inspection<br>Identify the clinical characteristics of a tetralogy spell<br>Recognize the clinical features of transposition of the great arteries |
| Diagnosis | Be able to:<br>Distinguish between central cyanosis and acrocyanosis<br>Recognize that the absence of improvement in arterial oxygen content with 100% oxygen in comparison with room air is compatible with the diagnosis of cyanotic congenital heart disease<br>Differentiate between cardiac and non-cardiac causes of cyanosis |
| Management | Understand the prognosis for a patient with tetralogy of Fallot<br>Understand the prognosis for cognitive development in patients with cyanotic congenital heart disease<br>Understand the role of ductus arteriosus in cyanotic congenital heart disease and the use of prostaglandin E1 in treatment<br>Be able to:<br>Plan for the immediate management of a child with a hypoxic spell<br>Initiate emergency management when necessary<br>Describe clinical signs and investigations accurately and effectively with a cardiologist<br>Refer to a pediatric cardiologist/cardiac surgeon for advice regarding surgery |

## *Cardiology*

| Acyanotic disease | |
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| History | Know the natural history of congestive heart failure of acyanotic heart disease during neonatal and infantile periods<br>Know the importance of patent ductus arteriosus in coarctation of the aorta<br>Know the expected natural history of ventricular septal defect<br>Know the expected natural history of a bicuspid aortic valve<br>Understand the risks for pulmonary vascular obstructive disease (eg, Eisenmenger) in patients with untreated large left-to-right shunt lesions with pulmonary hypertension (eg, large VSD, AV septal defect, large PDA) |
| Physical | Know that tachycardia, tachypnea, and failure to thrive are the triad of congestive heart failure in infants with large volume left-to-right shunt<br>Be able to:<br>Recognize the physical findings of congestive heart failure resulting from acyanotic heart disease |
| Diagnosis | Be able to:<br>Recognize the major clinical findings in patients with cardiac anomalies such as ventricular septal defect, atrial septal defect, patent ductus arteriosus, aortic stenosis, or pulmonic stenosis |
| Management | Be able to:<br>Plan the initial management of a premature infant with patent ductus arteriosus<br>Plan the immediate (eg, referral) and long-term (eg, frequent BP measurements) management in a patient with coarctation of the aorta<br>Plan the management of severe pulmonary valve stenosis<br>Refer to a pediatric cardiologist/cardiac surgeon regarding advice about surgery |
| Antenatal management | |
| Management | Be able to:<br>Plan the initial management of congenital heart diseases diagnosed prenatally<br>Refer to pediatric cardiology specialists immediately after birth as appropriate |

| **Acquired heart disease**<br>By the end of training a resident should: | |
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| Infectious and post-infectious diseases | |
| History | Know the microbiology of infective endocarditis<br>Know the epidemiology of infective endocarditis, including risk factors |
| Physical | Be able to:<br>Recognize the clinical manifestations of infective endocarditis |
| Diagnosis | Be able to:<br>Obtain a blood culture to make the diagnosis of infective endocarditis |
| Management | Be able to:<br>Prescribe antibiotic prophylaxis in children with congenital heart lesions when necessary<br>Prescribe drugs of choice for the prophylaxis of infective endocarditis<br>Plan the management of infective endocarditis |
| Infective endocarditis | |
| History | Know that bacterial endocarditis may acute or subacute<br>Know the risk factors for development of endocarditis (eg, congenital or rheumatic heart disease, poor dental hygiene, dental or surgical procedure, central venous catheter) |
| Physical | Be able to:<br>Recognize the clinical signs of endocarditis (eg, fever, tachycardia, new or change in existing murmur, evidence of embolic phenomena, splenomegaly) |
| Diagnosis | Understand the laboratory and radiologic features of endocarditis (eg, elevated CRP and ESR, leukocytosis, anemia, positive blood culture, hematuria, infiltrates on chest x-ray, masses that are consistent with vegetations on echocardiogram)<br>Be able to: |

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| | Diagnose infective endocarditis |
| Management | Be able to:<br>Prescribe prophylaxis for endocarditis as indicated<br>Advise parents about prophylaxis for endocarditis<br>Initiate appropriate investigations and treatment<br>Refer to a paediatric cardiologist appropriately |
| Rheumatic fever and rheumatic heart disease | |
| History | Know the epidemiology of rheumatic fever |
| Physical | Be able to:<br>Recognize the clinical manifestations of rheumatic fever<br>Identify murmurs of mitral insufficiency and aortic insufficiency as the most common murmurs in rheumatic fever |
| Diagnosis | Be able to:<br>Interpret the laboratory findings indicative of rheumatic fever<br>Utilize the major and minor criteria for diagnosing rheumatic fever<br>Obtain echocardiography for a patient with suspected rheumatic fever |
| Management | Be able to:<br>Plan the initial management of acute rheumatic fever<br>Plan long term penicillin administration to prevent the recurrence |
| Myocarditis | |
| History | Know the etiology of myocarditis<br>Know that the characteristic history of myocarditis shows congestive heart failure following symptoms of upper respiratory or gastrointestinal infections |

## *Cardiology*

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| Physical | Be able to:<br>Identify the clinical manifestations of myocarditis |
| Diagnosis | Be able to:<br>Plan the initial diagnostic evaluation of myocarditis (eg, echocardiograph)<br>Request echocardiography as it is indicated in children following symptoms of respiratory or gastric infection |
| Management | Be able to:<br>Initiate appropriate investigation and treatment for congestive heart failure<br>Evaluate patients with cardiogenic shock and initiate appropriate management<br>Refer to intensive care teams appropriately |
| Pericarditis/pericardial effusion | |
| History | Know the etiology and pathogenesis of pericarditis |
| Physical | Be able to:<br>Recognize the clinical manifestations of pericarditis<br>Recognize the tachycardia and the pulsus paradoxis due to cardiac tamponade of acute pericarditis<br>Recognize cardiac friction rub of pericarditis by auscultation |
| Diagnosis | Be able to:<br>Order an appropriate laboratory evaluation of pericarditis<br>Interpret the microbiology results for making the diagnosis of pericarditis |
| Management | Be able to:<br>Plan the treatment of pericarditis, including surgical drainage if necessary |
| Post-cardiac surgery disorders | |
| History | Know the common manifestations of postoperative complications of cardiac surgery |

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| | Know the common post-operative complications of major congenital heart diseases |
| Physical | Be able to:<br>Recognize the clinical features of postoperative disorders described above |
| Diagnosis | Be able to:<br>Identify the post-operative changes of chest X-ray and electrocardiogram<br>Obtain echocardiography when appropriate |
| Management | Be able to:<br>Refer to intensive care teams in acute post-operative period or cardiologists in chronic post-operative care<br>Advise on appropriate prophylaxis for infective endocarditis<br>Assess exercise tolerance of post-operative patients and plan accordingly |
| Kawasaki disease | |
| History | Know the cardiac complications of Kawasaki disease and the timing of onset |
| Physical | Be able to:<br>Recognize the clinical features of Kawasaki disease |
| Diagnosis | Be able to:<br>Formulate the differential diagnosis of Kawasaki disease<br>Differentiate the characteristic clinical symptoms of Kawasaki disease from other infectious diseases<br>Utilize the appropriate diagnostic criteria for diagnosing complete and incomplete forms of Kawasaki disease<br>Appropriately utilize laboratory and echocardiography results in the evaluation and management of patients with Kawasaki disease |
| Management | Be able to:<br>Plan the treatment of Kawasaki disease and prevention of coronary aneurysms, including follow-up evaluation |

## *Cardiology*

| **Rate and rhythm disorders**<br>By the end of training the resident should: | |
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| History | Know the causes of arrhythmias |
| Physical | Be able to:<br>Identify the clinical manifestations of common cardiac arrhythmias |
| Diagnosis | Be able to:<br>Identify a benign arrhythmia<br>Recognize common dysrhythmias using ECG<br>Differentiate arrhythmia that require emergent therapy, chronic therapy, and no therapy<br>Understand the clinical significance of a prolonged corrected QT Interval<br>Identify premature atrial contractions, premature ventricular contractions, supraventricular tachycardia, and ventricular tachycardia using electrocardiographic patterns |
| Management | Be able to:<br>Effectively use an Automatic External Defibrillator when appropriate<br>Initiate emergency treatment of arrhythmias such as ventricular tachycardia<br>Plan for the treatment of supraventricular tachycardia |

| **Systemic diseases affecting the heart (including metabolic disorders)**<br>By the end of training the resident should: | |
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| History | Know that hyperthyroidism should be considered in the evaluation of a patient with persistent sinus tachycardia<br>Understand that patients with Marfan syndrome may have associated cardiac disease that precludes participation in sports<br>Know the cardiovascular conditions associated with Turner syndrome<br>Know the importance of cardiovascular evaluation when there is a family history of hypertrophic cardiomyopathy, |

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| | muscular dystrophy, or Marfan syndrome<br>Understand the importance of a family history of cardiovascular disease and familial hyperlipidemia and hypercholesterolemia in children and evaluate appropriately |
| Physical | Be able to:<br>Recognize the signs and symptoms of superior vena cava syndrome |
| Diagnosis | Be able to:<br>Identify the cardiovascular risk factors in children and evaluate appropriately<br>Identify the cardiac symptoms concomitant with systemic features when formulating a diagnosis |
| Management | Be able to:<br>Plan the initial management of a child with a positive family history of hyperlipidemia |

| **Cardiomyopathies**<br>By the end of training the resident should: | |
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| History | Recognize risk factors for cardiomyopathy, including previous drugs<br>Be able to:<br>Take the familial history of cardiomyopathies and evaluate the recurrence risk |
| Physical | Be able to:<br>Describe the main clinical features resulting from cardiomyopathies<br>Describe the associated systemic disorder, such as Noonan syndrome and neuromuscular diseases |
| Diagnosis | Be able to:<br>Identify the diagnostic features of chest X-ray, electrocardiogram and echocardiogram of cardiomyopathy |
| Management | Understand the indications for medication in cardiomyopathies<br>Be able to: |

## *Cardiology*

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| | Recognize the importance of life-long supportive care to prevent a deterioration of cardiac function or sudden death<br><br>Refer to a pediatric cardiology specialist |

## *Dermatology*

| **General**<br>By the end of training, the resident should: | |
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| History | Know the characteristics of common and serious rashes<br>Know the causes of fever and erythematous rashes<br>Know about the cutaneous and mucosal manifestations of systemic disease<br>Understand the impact of severe dermatological problems on children<br>Understand the serious nature of some skin disorders or their associated conditions<br>Be aware of the different patterns of drug reaction and of the common precipitants<br>Be able to:<br>Identify any precipitants that may have caused rashes (eg, drugs, dietary, contact, infection) |
| Physical | Be able to:<br>Carefully handle blistered neonates in case of inherited skin fragility<br>Assess mucosal involvement<br>Accurately describe rashes that may be present |
| Diagnosis | Know the indications for and the procedure involved in skin biopsy<br>Be able to:<br>Diagnose common skin complaints<br>Diagnose potentially serious but uncommon skin conditions (eg, Kawasaki, toxic shock syndrome)<br>Investigate common skin complaints in order to arrive at the proper diagnosis |
| Management | Know which cutaneous defects in the newborn require referral to a specialist<br>Be able to:<br>Implement the appropriate principles of therapy for skin complaints |

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| | Seek consultation with other specialties as appropriate<br>Understand the different potencies of topical steroids and of their side effects<br>Manage common skin complaints |

| **Newborn skin**<br>By the end of training, the resident should: | |
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| Pigmentary and vascular lesions | |
| History | Know that the distribution of a port wine stain is important in determining whether it will be associated with a leptomeningeal angiomatosis (Sturge-Weber syndrome)<br>Know that the distribution, size, and number of large congenital melanocytic nevi are important in determining whether it will be associated with neuromelanosis (neurocutaneous melanosis) |
| Physical | Be able to:<br>Recognize the clinical manifestations of pigmentary and vascular lesions<br>Recognize the cutaneous and extracutaneous manifestations of pigmentary and vascular disorders |
| Diagnosis | Know the classifications system(s) for congenital melanocytic nevi<br>Be able to:<br>Recognize the neonatal skin findings for which evaluation of CNS is indicated (eg, sebaceous nevus, cutis aplasia)<br>Differentiate vascular malformations from hemangiomas |
| Management | Know that a tunable dye laser offers effective cosmetic palliation of port wine stains<br>Be able to:<br>Support parents who are distressed by perceived disfigurement of a child with a developmental vascular or pigmented skin lesion<br>Counsel parents on the long term management of children with a developmental vascular or pigmented skin lesion |

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| | Refer to a pediatric dermatologist when appropriate |
| Pustular lesions (eg, erythema toxicum, transient neonatal pustular dermatosis/melanosis, neonatal impetigo) | |
| History | Be able to:<br>Identify erythema toxicum through a description of the rash together with the age of appearance or disappearance |
| Physical | Be able to:<br>Identify the main location of pustular lesions of transient neonatal pustular dermatosis/melanosis<br>Identify erythema toxicum and neonatal impetigo |
| Diagnosis | Know that a Gram stain will help distinguish between transient neonatal pustular dermatosis/melanosis and staphylococcal pustules<br>Know that the lesions of erythema toxicum are filled with eosinophils<br>Be able to:<br>Identify the lesions of transient neonatal pustular dermatosis |
| Management | Be able to:<br>Treat neonatal impetigo with appropriate antibiotics<br>Reassure parents when erythema toxicum neonatorum and/or transient neonatal pustular dermatosis/melanosis are present |

| **Atopic dermatitis (eczema)**<br>By the end of training, the resident should: | |
|---|---|
| History | Understand the pathogenesis of atopic dermatitis<br>Understand the association between pruritus leading to skin trauma with exacerbation of lesions and infection<br>Understand that children with atopic dermatitis are prone to recurrent infections, particularly with S. aureus and herpes simplex |

## *Dermatology*

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| | Be able to:<br>Identify age of onset<br>Identify the characteristic features of atopic dermatitis (ie, pruritus, morphology and distribution, and chronic relapsing course)<br>Identify factors that worsen eczema (eg, drying, chemical irritants, heat, and physical trauma)<br>Question for a positive family history of atopy<br>Distinguish atopic dermatitis from contact dermatitis by history |
| Physical | Be able to:<br>Identify bacterial infected eczema, eczema herpeticum, and acute phase of atopic dermatitis<br>Identify age dependant distribution of skin lesions<br>Determine if the skin reacts abnormally to light strokes (dermographism) |
| Diagnosis | Know the diagnostic criteria for atopic dermatitis<br>Be able to:<br>Differentiate between atopic dermatitis and other skin lesions such as contact dermatitis and seborrheic dermatitis |
| Management | Be able to:<br>Plan and manage appropriate treatment of eczema and sebhorreic dermatitis (eg, emollients, corticosteroids, antibiotics, and allergen elimination when appropriate)<br>Advise parents about common problems such as cradle cap and nappy rash<br>Refer to a dermatologist when indicated |

| **Infectious rashes and infestations**<br>By the end of training, the resident should: |
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| General (See also ***Infectious Diseases***) |

## *Dermatology*

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| History | Know the etiology of skin infections and how this varies with age |
| Physical | Be able to:<br>Recognize the clinical manifestations of skin infections: impetigo, ecthyma, cellulitis, abscess |
| Diagnosis | Be able to:<br>Diagnose infectious rashes and infestations using appropriate diagnostic techniques when unable to make diagnosis by observation alone |
| Management | Know the possible complications of streptococcal skin infections<br>Be able to:<br>Plan and apply the treatment of skin infections associated with wounds |
| Impetigo | |
| History | Know the organisms that are responsible for impetigo<br>Know that S. aureus is the primary cause of both bullous and pustular impetigo<br>Understand that impetigo is the most common skin infection in children worldwide |
| Physical | Be able to:<br>Identify the clinical manifestations of impetigo, typically appearing first on the face or traumatized extremities<br>Recognize bullous versus nonbullous impetigo |
| Diagnosis | Be able to:<br>Differentiate between bullous and nonbullous variations<br>Identify variations in the infection for neonates versus children and adolescents |
| Management | Be able to:<br>Implement the treatment of skin infections associated with wounds<br>Manage impetigo appropriately depending on the number of lesions present |

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| | Prescribe systemic antibiotics for widespread involvement |
| Staphylococcal scalded skin syndrome | |
| History | Know that staphylococcal scalded skin syndrome is mediated by a toxin released by certain strains of staphylococci<br>Know the features of staphylococcal scalded skin syndrome<br>Understand the rarer causes of skin failure<br>Be able to:<br>Identify the principal symptoms of staphylococcal scalded skin syndrome |
| Physical | Be able to:<br>Describe the typical rash of staphylococcal scaled skin syndrome |
| Diagnosis | Be able to:<br>Differentiate staphylococcal scalded skin syndrome from impetigo |
| Management | Be able to:<br>Assess and start initial treatment of systemic therapy promptly<br>Consult dermatology and ophthalmology specialists when appropriate |
| Papular urticaria | |
| History | Understand that papular urticaria represents a hypersensitivity reaction to insect bites |
| Physical | Be able to:<br>Describe the rash of popular urticaria |
| Diagnosis | Be able to:<br>Diagnose papular urticaria through observation |
| Management | Be able to:<br>Administer the appropriate topical and systemic (antihistamine) treatments |

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| | Provide prophylactic treatment (repellents) when necessary |
| Scabies | |
| History | Understand the mode of transmission and life cycle of sarcoptes scabiei hominis<br>Know the typical distribution of the rash in scabies |
| Physical | Be able to:<br>Identify the clinical manifestations of scabies |
| Diagnosis | Be able to:<br>Distinguish between scabies and atopic dermatitis and insect bites |
| Management | Be able to:<br>Manage active scabies infection<br>Advise on treatment for all contacts and family members of a child with scabies |
| Fungal infections (eg, ringworm, candida, tinea) | |
| History | Know that tinea capitis occurs primarily in prepubertal children<br>Know that Candida Albicans is normally found in the lower bowel and the skin |
| Physical | Be able to:<br>Describe the clinical appearance of different fungal infections (eg, candida lesions, ringworm, and tinea capitis)<br>Identify the appearance of tinea versicolor |
| Diagnosis | Be able to:<br>Diagnose common fungal skin infections<br>Distinguish between tinea corporis and granuloma annulare<br>Distinguish between tinea pedis and atopic dermatitis |
| Management | Be able to: |

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| | Manage common skin fungal infections effectively |
| Molluscum contagiosum | |
| History | Know that the virus commonly spreads through skin-to-skin contact<br>Know that the virus may spread through autoinoculation |
| Physical | Be able to:<br>Describe the characteristic lesions of molluscum contagiosum |
| Diagnosis | Be able to:<br>Diagnose molluscum contagiosum through observation |
| Management | Be able to:<br>Provide proper management options for molluscum contagiosum |
| Warts (eg, condyloma acuminatum, verrucas, vulgaris, genital warts) | |
| History | Be able to:<br>Identify from the history the development and location of lesions that are suggestive of warts |
| Physical | Know the main location of each clinical type of warts<br>Be able to:<br>Recognize the clinical types of warts |
| Diagnosis | Be able to:<br>Diagnose wart infection through observation |
| Management | Know that the HPV genotypes may be associated with cancer<br>Know about HPV vaccine(s)<br>Be able to:<br>Provide effective management for warts |

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| | Counsel young girls on the mode of transmission of HPV and on HPV immunization |
| Pediculosis | |
| History | Know the life cycle of human lice<br>Know the different types of pediculosis (eg, capitis, corporis and pubis)<br>Be able to:<br>Identify features in the history that suggest a child may have pediculosis |
| Physical | Be able to:<br>Identify the eggs of lice in hair |
| Diagnosis | Be able to:<br>Diagnose pediculoses |
| Management | Be able to:<br>Plan the treatment for a patient with pediculosis |
| Cellulitis | |
| History | Be able to:<br>Identify features that may predispose a child to cellulitiseg lymphatic stasis, diabetes mellitus, or immunosuppression |
| Physical | Be able to:<br>Identify the clinical manifestations of cellulitis (eg, edema, warmth) |
| Diagnosis | Be able to:<br>Appropriately acquire aspirates, skin biopsy, and blood cultures to identify cellulitis |
| Management | Know when to provide parenteral versus oral penicillin<br>Be able to:<br>Plan treatment for various forms of cellulites taking into account the history of the illness, the location, age, |

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| | and immune status |
| Necrotizing fasciitis | |
| History | Know the risk factors for develop necrotizing fasciitis (eg, immune compromise, diabetes, recent surgery)<br>Know the association between necrotizing fasciitis and toxic shock syndrome |
| Physical | |
| Diagnosis | Be able to:<br>Diagnose necrotizing fasciitis through observation of the rash |
| Management | Be able to:<br>Employ immediate supportive care and parenteral antibiotic administration<br>Request surgical exploration as soon as the disorder is suspected in order to make a definitive diagnosis |

| **Hair disorders (eg, Hypertrichosis and hair loss)**<br>By the end of training, the resident should: | |
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| History | Know the common causes of hair loss and hypertrichosis<br>Know the normal transition fom vellus to terminal hair |
| Physical | Be able to:<br>Recognize the classic features of hair disorders |
| Diagnosis | Be able to:<br>Distinguish between alopecia areata and trichotillomania and traction alopecia<br>Recognize the classic features of hair disorders |
| Management | Be able to:<br>Counsel families of a child with telogen effluvium (stress-induced hair loss)<br>Support parents of children with alopecia areata who may be distressed at the lack of effective treatment |

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| | Counsel families on medications that may cause both hirsuitism and hair loss<br>Refer children with hair disorders to a dermatologist when indicated |

| **Neurocutaneous syndromes**<br>By the end of training, the resident should: | |
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| Neurofibromatosis | |
| History | Know about the distinguishing features of neurofibromatosis 1 and 2<br>Be able to:<br>Take a detailed family history in a child suspected of having neurofibromatosis |
| Physical | Be able to:<br>Identify the cutaneous features of neurofibromatosis |
| Diagnosis | Know the genetics of neurofibromatosis1 (autosomal- dominant, high spontaneous mutation rate, NF1 gene on chromosome 17)<br>Know the diagnostic criteria for Neurofibromatosis1<br>Know about preimplantation genetic diagnosis of neurofibromatosis type 1 |
| Management | Know about the association of optic nerve gliomas and when visual screening is appropriate<br>Know why it is important to monitor blood pressure<br>Be able to:<br>Refer the patient to a team of specialists to manage symptoms or complications |
| Tuberous sclerosis | |
| History | Know that the earliest sign of tuberous sclerosis may be hypopigmented macules<br>Be able to:<br>Identify symptoms with which tuberose sclerosis may present (eg, seizures and cognitive/behavioral impairments) |

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| | Take a detailed family history in a child with tuberose sclerosis |
| Physical | Be able to:<br>Identify the cutaneous manifestations |
| Diagnosis | Know the diagnostic criteria (major and minor features) for Tuberous sclerosis complex (definite, probable and possible)<br>Know the recommendations for sceening (eg, neuro-imaging)<br>Know the recommendations for renal ultrasound imaging<br>Know the genetics of tunerose scelrosis complex (eg, autosomal dominant, high spontaneous mutation rate, loci on chromosome 9q34 TS1 and 16p13 TSC2) |
| Management | Be able to:<br>Refer the patient to a team of specialists to manage symptoms or complications |
| Sturge-Weber syndrome | |
| History | Know that Sturge-Weber syndrome is manifested at birth with a port wine stain birthmark in the distribution of the first branch of the trigeminal nerve |
| Physical | Be able to:<br>Identify the clinical manifestations of the disease |
| Diagnosis | Know the diagnostic criteria for Sturge Weber syndrome<br>Be able to:<br>Utilize MRI studies to identify intracranial abnormalities |
| Management | Be able to:<br>Counsel families of the high risk of seizures<br>Refer the patient to a team of specialists to manage symptoms or complications |
| Ataxia telangectasia (see ***Neurology***) | |

## *Dermatology*

| **Pigmented lesions (Hyper- and Hypo-pigmentation)**<br>By the end of training, the resident should: | |
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| History | Know the hereditary syndromes associated with hypopigmentation<br>Know the association of vitiligo with autoimmune diseases |
| Physical | Be able to:<br>Identify when a pigmented lesion is likely to be malignant<br>Identify hypopigmented lesions |
| Diagnosis | Be able to:<br>Distinguish between vitiligo and post inflammatory hypopigmentation<br>Distinguish between post inflammatory hyperpigmentation and a pigmented nevus |
| Management | Be able to:<br>Reassure parents of children with none serious disorders of pigmentation<br>Refer children with serious conditions to a specialist |

| **Acne**<br>By the end of training, the resident should: | |
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| History | Be aware that a characteristic form of acne may develop in teenagers receiving corticosteroids |
| Physical | Be able to:<br>Recognize the characteristic lesions of acne (eg, open and closed comedones, papules, pustules) |
| Diagnosis | Be able to:<br>Differentiate acne vulgaris from rosacea and/or acneiform lesions |
| Management | Know when to prescribe systemic antibiotics for acne and which antibiotics to use<br>Be able to: |

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| | Plan for the treatment of acne vulgaris with first-line topical medications, retinoic acid, and benzoyl peroxide |

| **Miscellaneous**<br>By the end of training, the resident should: | |
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| Hemangiomas | |
| History | Know the typical course of strawberry hemangiomas |
| Physical | Be able to:<br>Recognize the signs and symptoms of hemangiomas |
| Diagnosis | Be able to:<br>Distinguish between hemangioma and vascular malformation |
| Management | Understand the complications of hemangiomas (eg, ulceration, infection, encroachment on vital structures)<br>Know the therapeutic indications for hemangiomas<br>Be able to:<br>Provide supportive treatment while waiting on the natural resolution<br>Counsel parents on the natural history of strawberry hemangioma |
| Erythema multiforme, Stevens-Johnson syndrome | |
| History | Know the classification of erythema multiforme |
| Physical | Be able to:<br>Recognize the spectrum of severity of erythema multiforme ranges from targetoid lesions to Stevens-Johnson syndrome |
| Diagnosis | Be able to:<br>Confirm a diagnosis by biopsy |
| Management | Know that treatment with corticosteroids is controversial<br>Be able to: |

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| | Treat patients with Stevens Johnson syndrome similar to those with thermal burns |
| Contact dermatitis | |
| History | Know the classification of contact dermatitis as allergic, irritant, and/or photo-contact<br>Be able to:<br>Take a history identifying the likely cause |
| Physical | Be able to:<br>Identify linear vesicles and papules for making the diagnosis |
| Diagnosis | Be able to:<br>Make the diagnosis through history and observation |
| Management | Know the treatment and prevention of contact dermatitis |
| Short- and long-term effects of sun exposure | |
| History | Know that sun damage to the skin is additive and leads to aging of the skin as well as an increased incidence of skin cancers<br>Know that repeated sunburns are recognized as a major risk factor for melanoma |
| Physical | Be able to:<br>Identify the symptoms and degree of a sunburn<br>Identify the skin lesions due to long term effects of sun exposure |
| Diagnosis | Be able to:<br>Diagnose the degree of a sunburn through history and observation |
| Management | Be able to:<br>Prescribe sun protection strategies<br>Treat first degree burns due to sun exposure<br>Refer to a specialist appropriately |

## *Dermatology*

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| Ectodermal dysplasia | |
| History | Know that ectodermal dysplasia comprises many syndromes resulting from abnormalities of at least two ectodermal structures |
| Physical | Be able to:<br>Recognize the characteristic abnormalities of hair, teeth nails, and/or sweat glands with ectodermal dysplasia |
| Diagnosis | Know the diagnostic criteria for hypohydrotic ectodermal dyplasia<br>Know the diagnostic criteria for Ectrodactyly–ectodermal dysplasia–cleft syndrome |
| Management | Be able to:<br>Refer to a geneticist or other appropriate specialist |
| Dermoids | |
| History | Know that dermoids are benign congenital tumors that contain tissue not found normally at that site |
| Physical | Be able to:<br>Identify the clinical manifestations of dermoids according to the location |
| Diagnosis | Be able to:<br>Use computed tomography scanning as the preferred imaging modality in the evaluation of mediastinal lesions<br>Confirm the clinical diagnosis of dermoids by histology |
| Management | Be able to:<br>Refer to specialist(s) appropriately |
| Ichthyosis vularis | |
| History | Know that ichthyosis vulgaris commonly occurs in children with atopic dermatitis |
| Physical | Be able to:<br>Identify the clinical manifestations of ichthyosis vulgaris |

## *Dermatology*

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| Diagnosis | Be able to:<br>Diagnose ichthyosis vulgaris through observation |
| Management | Understand that keratolytic agents (eg, lactic acid, citric acid) are effective therapies in the management of ichthyosis vulgaris |
| Psoriasis | |
| History | Know that juvenile psoriatic arthritis accounts for 8-20% of Juvenile Idiopathic Arthritis<br>Know that the swelling joint in young children is often painless resulting in delay in diagnosis<br>Know that approximately 10% of children with psoriatic arthritis develop anterior uveitis, which is asymptomatic, and may lead to band keratopathy, glaucoma, and/or cataracts<br>Know that children presenting with balantitis, vulvitis and peri-anal itching may have psoriasis<br>Be able to:<br>Identify factors that may have precipitated psoriasis<br>Identify if there are associated features of arthopathy<br>Take a detailed family history identifying other members who may have the condition |
| Physical | Be able to:<br>Identify the adult type erythematous plaques, guttate psoriasis, micropapular psoriasis and generalized putular psoriasis |
| Diagnosis | Be able to:<br>Differentiate between the different types of psoriasis<br>Distinguish psoriasis from other skin lesions |
| Management | Be able to:<br>Provide urgent treatment for generalized pustular psoriasis<br>Initiate treatment with topical moisturizers |

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| | Counsel parents about other treatments including tar ointments<br>Refer to a pediatric dermatologist |
| Pityriasis rosea | |
| History | Know that pityriasis rosea is of unknown origin/cause |
| Physical | Be able to:<br>Identify the herald patch<br>Identify the characteristic type and location of the lesions |
| Diagnosis | Know that secondary syphilis may mimic pityriasis rosea<br>Be able to:<br>Diagnose pityriasis rosea through observation of the rash |
| Management | Be able to:<br>Reassure the patient and parents when asymptomatic<br>Prescribe emollients or lotions for more prominent cases |
| Seborrheic dermatitis | |
| History | Know that cradle cap, is a harmless, temporary condition |
| Physical | Be able to:<br>Recognize the clinical manifestation of seborrheic dermatitis in infancy |
| Diagnosis | Be able to:<br>Differentiate the appearance and location of seborrheic dermatitis from similar skin lesions (eg, histocytosis) |
| Management | Be able to:<br>Prescribe topical emollients and a soft brush to loosen the scales as an effective therapy in the management of cradle cap |
| Cutaneous manifestations (endocrine, metabolic, and nutritional disorders) | |

## *Dermatology*

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| History | Know that acrodermatitis enteropathica is a manifestation of zinc deficiency<br>Understand the association of acanthosis nigricans with insulin resistance |
| Physical | Be able to:<br>Recognize the skin signs and extracutaneous manifestations<br>Identify the skin signs of acanthosis nigricans |
| Diagnosis | Be able to:<br>Diagnose acanthosis nigricans and acrodermatitis enteropathica through observation of the rash |
| Management | Be able to:<br>Treat patients with acrodermatitis enteropathica with lifelong zinc supplementation<br>Refer patients with acanthosis nigricans to an endocrinologist as necessary |
| Urticaria | |
| History | Know that spontaneous or idiopathic urticaria is divided into acute (<6 weeks) and chronic (≥6 weeks)<br>Know that physical urticaria is produced by direct physical stimulation of the skin<br>Be able to:<br>Identify triggering factors from the history |
| Physical | Be able to:<br>Identify the typical lesions of urticaria |
| Diagnosis | Be able to:<br>Diagnose urticaria from history and observation of the lesions |
| Management | Be able to:<br>Utilize oral non-sedating H1 antihistamines as a first line treatment for urticaria<br>Counsel families how to avoid urticaria |

## *Dermatology*

| Nail disorders | |
|---|---|
| History | Know that pitting and splitting of the nail is frequently associated with psoriasis<br>Know that Beau lines in nails soon after birth is associated with intrauterine distress<br>Know that congenital Pachyonychia is mainly differentiated from psoriasis and ichthyosis syndromes<br>Know nail abnormalities seen in nutritional deficiencies |
| Physical | Be able to:<br>Identify the signs of nail disorders<br>Identify the clinical manifestations of associated diseases |
| Diagnosis | Be able to:<br>Select diagnostic tests for associated diseases(eg, for Turners if spoon shaped nails and other features) |
| Management | Be able to:<br>Refer to a pediatric dermatologist as necessary |
| Mucosal disorders | |
| History | Know that Behçet's disease is characterized by recurrent oral ulceration, genital ulceration, and ophthalmologic inflammation<br>Know that in Stevens Johnson syndrome at least two mucosal membranes are affected |
| Physical | Be able to:<br>Recognize the clinical manifestations of Behçet's disease and Stevens Johnson syndrome |
| Diagnosis | Know the diagnostic criteria for Behcet's disease and Stevens Johnson syndrome |
| Management | Be able to:<br>Develop a management plan for mucosal disorders<br>Refer to dermatology specialist when appropriate |

## *Endocrinology (see also Metabolism)*

| **General**<br>By the end of training, the resident should: | |
|---|---|
| History | Understand the implications of endocrine complications of other diseases<br>Know that many endocrine conditions are familial<br>Know that maternal illness and drugs in pregnancy can affect endocrine function<br>Know that recurrent hypoglycemia may be a presenting symptom of a number of endocrine disorders<br>Be able to:<br>Elicit features in the family history, or symptoms, suggestive of an endocrine disorder |
| Physical | Know the differences between adrenarche and gonadarche<br>Know the importance of fundal examination in children with abnormal growth<br>Be able to:<br>Measure children accurately and assess their growth using appropriate growth charts<br>Evaluate disproportionate stature<br>Measure head circumference accurately in children under 3 years of age<br>Assess accurately sexual maturity using SMR (Sexual Maturity Rating) stages<br>Identify clinical changes related to adrenarche and gonadarche<br>Identify signs that may be associated with endocrine disease (eg, hirsuitism, hypertension) |
| Diagnosis | Know from which body fluid to request endocrine tests (eg, saliva, urine, blood)<br>Be able to:<br>Differentiate between baseline and stimulated hormone values |

## *Endocrinology (see also Metabolism)*

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| | Interpret bone age in relation to growth and pubertal development |
| Management | Be able to:<br>Communicate effectively with patients (ie, age appropriate) and their parents<br>Consult effectively with specialists |

| **Presenting Symptoms/Signs**<br>By the end of training, the resident should: | |
|---|---|
| Short Stature (constitutional; familial; chronic systemic diseases; endocrine; syndromic) | |
| History | Know the developmental spectrum of normal growth velocity and the significance of a decreased growth velocity at any stage of development<br>Know the most common causes of short stature with normal growth velocity (eg, intrauterine growth retardation, Russell Silver syndrome, constitutional delay, familial short stature)<br>Know the reasons for short stature with decreased growth velocity (eg, endocrine disease, chronic disease, malnutrition, psychosocial, chromosomal abnormailities)<br>Know the importance of parental stature and pubertal development in the evaluation of a child with short stature<br>Be able to:<br>Establish whether a child has always been short or has begun growing slowly more recently<br>Elicit potential predisposing factors for a child who is short or growing slowly |
| Physical | Know how to use growth charts to evaluate constitutional growth delay<br>Understand the importance of the upper to lower segment ratio and arm span in evaluating children with short stature<br>Be able to: |

## *Endocrinology (see also Metabolism)*

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| | Measure children accurately and assess their growth using growth charts<br>Plot mid-parental height<br>Recognize the signs of gonadal dysgenesis (eg, Turner syndrome)<br>Recognize the signs of acquired and congenital growth hormone deficiency (eg, hypoglycemia, micropenis, truncal obesity, immature appearance)<br>Recognize the signs of other endocrine disease associated with short stature (eg, Cushings, hypothyroidism) |
| Diagnosis | Know when short stature needs to be investigated<br>Be able to:<br>Use growth charts to distinguish between constitutional short stature, genetic (familial) short stature, short stature related to chronic diseases, and short stature related to genetic, chromosomal, and syndromic causes<br>Utilize baseline and provocative testing appropriately to help establish a diagnosis<br>Use the proper diagnostic tests for gonadal dysgenesis (eg, Turner syndrome), including karyotype, serum concentrations of luteinizing hormone, follicle-stimulating hormone, and estradiol<br>Evaluate for cardiac and renal disorders in gonadal dysgenesis |
| Management | Know the indications for the use of growth hormone and anabolic steroids<br>Be able to:<br>Discuss with patients and families potential treatments for short stature<br>Explain to parents and patients the reason for, and outcome of, genetic short stature and constitutional delay, |

## *Endocrinology (see also Metabolism)*

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| | Advise parents about the possible psychological problems related to short stature, especially in males<br>Refer a patient with short stature to an endocrinologist when necessary |
| Tall Stature | |
| History | Know the most common causes of tall stature or a rapidly growing child<br>Know the natural history of familial tall stature<br>Know the importance of parental stature and pubertal development in the evaluation of a child with tall stature |
| Physical | Understand the importance of the upper to lower segment ratio and arm span in evaluating children with tall stature<br>Be able to:<br>Measure children accurately and assess their growth using growth charts<br>Identify dysmorphic features (eg, those of Marfan, Soto, and Klinefelter syndromes) |
| Diagnosis | Be able to:<br>Distinguish between familial tall stature, tall stature related to endocrine causes, and genetic/chromosomal causes (syndromic), by growth chart evaluation<br>Use laboratory tests effectively to distinguish between familial tall stature and other conditions |
| Management | Be able to:<br>Advise about the possible psychological problems related to tall stature (especially in females)<br>Refer a patient with tall stature to an endocrinologist as necessary |
| Precocious pubertal signs (telarche; pubarche; gynecomastia; complete puberty) (for normal puberty see ***Adolescence***) | |
| History | Understand the difference between pseudopuberty (ie, loss of consonance or abnormal sequence of pubertal changes) and true precocious puberty |

## *Endocrinology (see also Metabolism)*

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| | Know that premature thelarche occurs without other signs of puberty, is most common among those 1 to 4 years of age, and often regresses spontaneously<br>Understand the relationship between adrenarche and premature pubarche<br>Know the adrenal and gonadal causes of pseudopuberty<br>Be aware that precocious sexual development may be a presenting feature of McCune Albright syndrome<br>Know the pathophysiology and differentiating features of normal vs abnormal gynecomastia in males<br>Know the causes of true/complete precocious puberty (eg, idiopathic central, intracranial tumours, gonadotrophin independent precocious puberty)<br>Be able to:<br>Obtain an accurate history of the timing of any signs of pubertal development and detect any abnormal sequence of changes<br>Obtain a history of medication use, including phytoestrogens and estrogen-based creams, when evaluating a child with premature breast development |
| Physical | Be able to:<br>Identify signs of pubertal development<br>Evaluate the degree of pubertal development observed<br>Evaluate linear growth (eg, possible acceleration) in relation to pubertal development<br>Measure testicular size and penile length<br>Identify tumors that may produce precocious puberty (eg, CNS, ovary, testes, adrenal glands, liver) |
| Diagnosis | Know the age at which it is reasonable to investigate girls and boys with secondary sexual characteristics<br>Be able to: |

## *Endocrinology (see also Metabolism)*

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| | Formulate the differential diagnosis of precocious puberty<br>Distinguish between the variations of normal (eg, thelarche, pubarche) and precocious puberty<br>Select investigations appropriately according to presence or absence of consonance and presence or absence of other physical signs<br>Use laboratory tests effectively to distinguish between adrenal, gonadal and central causes for pubertal changes |
| Management | Know the rational behind the type of treatment used in the various causes (complete and incomplete) of precocious puberty<br>Be able to<br>Refer a patient with precocious puberty to an endocrinologist |
| Delayed puberty | |
| History | Understand the difference between delayed and absence of puberty<br>Understand the difference between constitutional delay of growth and puberty and pathological causes of delayed puberty<br>Know the natural history of constitutional delayed puberty<br>Know the pathological causes of delayed puberty (eg, chronic systemic disease, nutrition, hypo-thalamic pituitary disorders, gonadal disorders)<br>Be aware of genetic syndromes associated with gonadotrophin deficiency(eg, Kallman, Laurence-Moon- Biedl, Prader Willi)<br>Understand the familial influences on the onset of puberty<br>Be able to:<br>Identify possible risk factors for delayed puberty (eg, familial, chronic disease) |

## *Endocrinology (see also Metabolism)*

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| Physical | Be able to:<br>Recognize the signs of Turner and Klinefelter Syndromes<br>Recognize dysmorphic features seen in other syndromes (eg, polydactyl and retinitis pigmentosa in Laurence-Moon-Biedl)<br>Evaluate the degree (Sexual Maturity Rating) of pubertal development observed<br>Evaluate linear growth (possible deceleration) in relation to lack of pubertal development and advancing age<br>Measure and interpret testicular size and penile length |
| Diagnosis | Know that distinguishing physiological from pathological delay may be impossible clinically<br>Know that a significantly elevated prolactin is a sensitive indicator of intracranial pathology as a cause of hypogonadotrophic hypogonadism<br>Be able to:<br>Interpret the growth chart and bone age x-ray when evaluating constitutional delayed puberty<br>Interpret basal and stimulated levels of gonadotrophins and testosterone response to human chorionic gonadotrophin(HCG)<br>Utilize appropriate genetic testing |
| Management | Understand the possible emotional and psychological problems related to delayed puberty<br>Understand the use of estrogen and testosterone for pubertal induction<br>Know about the use of anabolic steroids<br>Be able to:<br>Plan for the treatment for constitutional delayed puberty as indicated |

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| | Explain to parents and patients the cause and outcome for non-serious causes of delayed puberty (eg, constitutional delay)<br>Refer to an endocrinologist as appropriate |
| Obesity (see ***Nutrition***) | |
| Abnormal Genitalia at Birth (Micropenis; Ambiguous; phenotypic male with no testes; phenotypic female genitalia with testes*)* *(*see also ***Critical Care in Neonates****)* | |
| History | Know the steps involved in normal sex differentiation<br>Be aware of the causes of abnormal genitalia at birth<br>Understand that maternal exposure to androgens or progesterones can cause virilization in genetically female infants |
| Physical | Be able to:<br>Identify a small penis and under developed genitalia in a neonate<br>Identify other congenital abnormalities suggesting syndromes in which hypogonadism is a feature<br>Identify clitoromegaly<br>Identify whether the gonads are palpable |
| Diagnosis | Know that if gonads are palpable the baby is likely to be XY karyotype with defect in testosterone synthesis or tissue sensitivity to androgen<br>Know that if gonads are impalpable the most likely diagnosis is congenital adrenal hyperplasia<br>Know the importance of early evaluation of karyotype<br>Be able to:<br>Use appropriate laboratory evaluation for congenital adrenal hyperplasia |

## *Endocrinology (see also Metabolism)*

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| | Use appropriate laboratory evaluation for micropenis in the first 4-5 months of life |
| Management | Recognize that a male infant born with non-palpable testes is to be considered a female until proven otherwise<br>Understand the extreme sensitivity of this presentation and of the need to seek urgent help from more experienced colleagues with regards to management and counseling parents<br>Be able to:<br>Provide appropriate information to parents while awaiting help from more experienced colleagues<br>Plan the treatment for an adrenal crisis in a patient with congenital adrenal hyperplasia<br>Consult effectively with specialists |
| Polyuria | |
| History | Know normal output of urine/kg and the definition of polyuria<br>Know the endocrine control of water metabolism<br>Know the pathophysiologic mechanisms responsible for polyuria (eg, increased fluid intake, increased glomerular filtration rate, increased output of solutes [NaCl, glucose, calcium], and inability of the kidney to reabsorb water in the distal tubule)<br>Know the most common causes of polyuria (eg, diabetes mellitus, central diabetes insipidus, nephrogenic diabetes Insipidus, hypercalcemia, behavioral)<br>Know hereditary causes of polyuria<br>Be able to:<br>Take an accurate history of frequency ,volume, and timing of urine passed<br>Make an accurate assessment of fluid intake |
| Physical | Be able to: |

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| | Assess hydration status |
| Diagnosis | Know the hazards associated with water deprivation tests<br>Be able to:<br>Use laboratory investigations to differentiate between central and renal concentration defects<br>Interpret urine osmolality and electrolyte disturbances in the context of polyuria<br>Select investigations to diagnose the causes of central diabetes insipidus |
| Management | Be able to:<br>Plan the therapeutic approaches for polyuria dependent on the causes<br>Advise parents about the fluid intake in both habitual water drinking and in diabetes insipidus<br>Manage the dangers of water deprivation<br>Refer a patient to a specialist (eg, endocrinologist, nephrologist, neurosurgeon) when appropriate |
| Goiter | |
| History | Understand that an enlarged thyroid is a frequent clinical finding, ie, in approximately 2-5% of the population<br>Know the causes of a thyroid enlargement (eg, iodine deficiency, Hashimoto thyroiditis, thyrotoxicosis, hypothyroidism)<br>Know that Hashimoto thyroiditis is the most common cause of goiter in adolescents<br>Know the significance of a previous history of irradiation to the head and neck in a patient with a thyroid mass/nodule<br>Be able to:<br>Elicit features suggestive of hyper or hypothyroidism |

## *Endocrinology (see also Metabolism)*

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| Physical | Be able to:<br>Identify and classify an enlarged thyroid<br>Distinguish between a symmetrically vs a non-symmetrically enlarged thyroid gland<br>Detect features of hyper and hypothyroisism if present<br>Differentiate between a thyroid cyst/tumor and Hashimoto thyroiditis<br>Identify a thyroglossal duct cyst and differentiate from an enlarged thryroid |
| Diagnosis | Know that a solitary thyroid nodule may be a sign of thyroid cancer<br>Be able to:<br>Interpret the significance of a symmetrical vs a non-symmetrical enlarged thyroid gland (eg. cyst, nodule, tumor)<br>Use the appropriate laboratory evaluation for diagnosing an enlarged thyroid (eg, thyroid hormone levels, antibody levels, ultrasound, isotope scanning)<br>Interpret the presence or absence of antithyroid antibodies<br>Select tests for disease associations with Hashimoto thyroiditis |
| Management | Be able to:<br>Manage hypo or hyperthyroidism in consultation with a specialist as appropriate<br>Manage associated autoimmune disorders associated with Hashimoto thyroiditis in consultation with a specialist as appropriate<br>Refer a child with a thyroid mass/nodule to a specialist for treatment<br>Communicate effectively with patient and parents |
| Hypoglycemia (for neonatal hypoglycemia see ***Critical Care in Neonates***) | |

## *Endocrinology (see also Metabolism)*

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| History | Know the causes of hypoglycemia in the various age groups(eg, starvation, hyperinsulinism, endocrine disorders, inborn errors of metabolism, liver disease)<br>Know that ketotic hypoglycemia is the most common type of hypoglycemia presenting in early childhood<br>Be able to:<br>Identify the symptoms of hypoglycemia in neonates (eg, jitteriness, hypotonia, feeding difficulties, apnea, convulsions)<br>Identify symptoms of hypoglycemia in older children( eg, neurologic: confusion, bizarre behavior, headache, visual disturbances, irritability or counter-regulation: pallor, sweating , nausea, vomiting)<br>Identify features associated with ketotic hypoglycemia (eg, poor growth and nutrition) |
| Physical | Be able to:<br>Recognize the clinical features that would suggest hypopituitarism or adrenal insufficiency<br>Recognize the signs of hypoglycemia in the various age groups |
| Diagnosis | Know the definition of hypoglycemia (ie, blood glucose < 2.2 mmol/l)<br>Be able to:<br>Check blood glucose in all patients with impaired conscious state or seizures<br>Perform relevant investigations in order to distinguish between the two forms of hypoglycaemia (eg, ketotic and non-ketotic)<br>Consider rare causes of hypoglycemia and the proper studies to investigate during the hypoglycemic episode |
| Management | Be able to:<br>Treat acute hypoglycemia safely and effectively with intravenous glucose or glucagon where appropriate |

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| | Manage the complications of hypoglycemia<br>Manage the underlying condition or refer a patient to a specialist as appropriate |
| Hypocalcemia (for phosphate and magnesium disorders see ***Fluid, Electrolyte and Acid-Based Disorders of an Emergent Nature***) | |
| History | Know the metabolic actions of PTH and vitamin D on the intestine, kidney, and bone<br>Know the role of magnesium in hypocalcemia<br>Know the causes of neonatal hypocalcemia (ie, early and late)<br>Know the causes of hypocalcemia in older children (eg, hypoparathyroidism and pseudo-hypoparathyroidism)<br>Know that familial hypoparathyroidism may be associated with polylandular auto-immune disease<br>Be able to:<br>Elicit the symptoms associated with hypocalcemia (eg, tetany, muscle cramps, convulsions, cardiac dysrhythmias)<br>Elicit any positive family history of hypoparathyroidism or other associated diseases |
| Physical | Be able to:<br>Identify the clinical signs of hypocalcemia at all ages<br>Demonstrate a positive Chvostek or Trouseau signs<br>Identify the characteristic somatic features of pseudo-hypoparathyroidism |
| Diagnosis | Be able to:<br>Suspect vitamin D deficiency in the presence of hypocalcemia with hypophosphatemia<br>Select and interpret appropriate investigations to determine the cause of hypocalcemia in both neonates and older children |

## *Endocrinology (see also Metabolism)*

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| Management | Be able to:<br>Treat acute symptomatic hypocalcemia safely<br>Plan the management and treatment of hypocalcemia at all ages<br>Refer a patient to a specialist when appropriate |
| Hypercalcemia | |
| History | Know that hypercalcemia may be related to increased intestinal absorption or increased bone mobilization<br>Know the causes of hypercalcemia (eg, Williams syndrome, idiopathic hypercalcemia of infancy, familial hypocalcuric hypercalcemia, hyperparathyroidism, hypervitaminosis D, sarcoidosis)<br>Know the association between of hypercalcemia and vitamin A intoxication<br>Understand the possibility of hypercalcemia following prolonged immobilization<br>Be able to:<br>Identify symptoms associated with hypercalcemia(eg, polyuria, nausea, vomiting, constipation, abdominal pain, renal stones, irritability)<br>Take a careful drug history |
| Physical | Know the importance of measuring blood pressure |
| Diagnosis | Be able to:<br>Select and interpret appropriate laboratory investigations including vitamin D levels and parathyroid hormone<br>Utilize radiological investigations including looking for nephrocalcinosis |
| Management | Know that treatment can be a combination of withdrawing sources of calcium, increasing excretion and decreasing gut absorption |

## *Endocrinology (see also Metabolism)*

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| | Be able to:<br>Manage acute hypercalcemia<br>Refer a patient to a specialist (endocrinologist, surgeon) when appropriate |

| **Specific Diseases**<br>By the end of training, the resident should: | |
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| Hypothyroidism (Congenital and Acquired) | |
| History | Know about national screening programs for congenital hypothyroidism in your country<br>Know the various causes of congenital hypothyroidism( eg, thyroid dysgenesis, dyshormogenesis, hypothalamic-hypopituitary hypothyroidism)<br>Know the causes of acquired hypo-thyroidism (eg, autoimmune, iodine deficiency, toxins, hypothalamic-pituitary disease)<br>Be able to:<br>Identify symptoms suggestive of hypothyroidism (eg, poor feeding, floppy baby, prolonged jaundice, poor school performance, slow growth and short stature) |
| Physical | Be able to:<br>Detect a goiter<br>Identify clinical features (eg, coarse facies, skin and hair changes, slow reflexes)<br>Recognize the auxologic (ie, length/height and weight) changes in hypothyroidism |
| Diagnosis | Be able to:<br>Select and interpret the laboratory results to confirm hypothyroidism<br>Select and interpret the laboratory results to distinguish the various causes of congenital or |

## *Endocrinology (see also Metabolism)*

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| | acquired hypothyroidism |
| Management | Know the consequences of untreated or delayed treatment of hypothyroidism in the neonate<br>Be able to:<br>Provide precise treatment and monitoring for both congenital and acquired hypothyroidism<br>Use TSH (Thyroid Stimulating Hormone) appropriately to guide treatment<br>Advise parents of the prognosis for a patient with congenital or acquired hypothyroidism<br>Refer a patient to a specialist when appropriate |
| Hyperthyroidism (Neonatal and Acquired) | |
| History | Know the cause of neonatal hyperthyroidism and its natural history<br>Know the various causes of acquired hyperthyroidism<br>Know that Hashimoto thyroiditis may manifest with an initial phase of hyperthyroidism<br>Know that in children, hyperthyroidism may also be due to a selective increase of T3 (T3-thyrotoxicosis)<br>Be able to:<br>Elicit a family history of thyroid disease<br>Elicit symptoms suggestive of thyroid disease (eg, poor school performance, tiredness, behaviour disturbance, weight loss) |
| Physical | Be able to:<br>Identify the signs of neonatal and childhood thyrotoxicosis<br>Recognize the auxologic (ie, length/height and weight) changes in hyperthyroidism |
| Diagnosis | Be able to: |

## *Endocrinology (see also Metabolism)*

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| | Select and Interpret the laboratory results to confirm hyperthyroidism |
| Management | Know the consequences of untreated neonatal and acquired hyperthyroidism and therefore the need for urgent treatment<br>Be able to:<br>Plan for the appropriate modality for the treatment of hyperthyroidism (eg, pharmacologic, radioactive, surgical)<br>Manage the possible complications of the three forms of treatment<br>Refer a patient to a specialist when appropriate |
| Adrenal insufficiency (Addison disease) | |
| History | Know the causes of adrenal insufficiency (eg, primary, autoimmune, corticosteroid adrenal suppression)<br>Know the associations with other endocrinopathies<br>Be able to:<br>Elicit symptoms suggestive of adrenal insufficiency (eg, tiredness, muscle weakness, gastrointestinal disturbances, excess pigmentation)<br>Elicit a personal or family history of other endocrinopahties |
| Physical | Be able to:<br>Recognize the signs of adrenal insuffiency (eg, hypotension, skin pigmentation, dehydration)<br>Recognize the auxologic (ie, length/height and weight) changes in Addison disease |
| Diagnosis | Be able to:<br>Interpret the glucose and electrolyte findings seen in adrenal insufficiency<br>Select and interpret additional investigations |

## *Endocrinology (see also Metabolism)*

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| | Select investigations to determine the adequacy of adrenal function following prolonged use of steroids (eg, ACTH stimulation test) |
| Management | Be able to:<br>Manage an acute adrenal crisis<br>Manage after discontinuation of prolonged exogenous corticosteroid therapy<br>Manage the complications of sudden withdrawal of corticosteroids in pharmacologic doses in patients with adrenal insufficiency<br>Manage a patient with adrenal insufficiency in acute illness<br>Counsel families of children with adrenal insufficiency on management during acute illness to prevent crises<br>Refer a patient to a specialist when appropriate |
| Adrenal hyperactivity : Cushing Disease/Syndrome | |
| History | Understand the difference between Cushing Disease and Syndrome<br>Know the causes of Cushing disease/syndrome<br>Know that exogenous corticosteroids (including topical and inhaled preparations) can cause signs of Cushing syndrome |
| Physical | Be able to:<br>Recognize the signs of Cushing disease/syndrome (eg, typical facies, truncal obesity)<br>Recognize the auxologic (ie, length/height and weight) changes in Cushing disease |
| Diagnosis | Be able to:<br>Correctly evaluate an obese patient for the diagnosis of Cushing disease/syndrome (eg, height, |

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| | weight, growth velocity, and bone age)<br>Use laboratory tests effectively for the diagnosis of Cushing disease/syndrome |
| Management | Be able to:<br>Refer a patient to a specialist as appropriate |
| Congental Adrenal Hyperplasia (CAH) | |
| History | Know the inheritance of CAH<br>Know about the enzyme pathways and which enzymes may be deficient<br>Be able to:<br>Elicit from the history symptoms suggestive of both salt wasting and non salt wasting variants |
| Physical | Be able to:<br>Identify virilization<br>Identify precocious puberty and short stature in late presenters<br>Identify hypertension in 11 beta hydroxylase deficiency<br>Identify dehydration if present in salt wasting cariants |
| Diagnosis | Know that antenatal diagnosis is possible<br>Know that neonatal screening measuring 17 hydroxy progesterone is carried out in some countries<br>Know that genotyping may be a helpful and useful diagnostic adjunct to neonatal screening<br>Be able to:<br>Use clinical findings together with laboratory investigations to distinguish various types |
| Management | Understand the significant mortality and morbidity arising from lack of diagnosis |

## *Endocrinology (see also Metabolism)*

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| | Be able to:<br>Manage acute salt wasting crises<br>Provide long term hormone replacement therapy and monitoring in consultation with a specialist as necessary<br>Consult with specialists over gender assignment and management |
| Pituitary Gland Disorders (hypopituitarism; hypogonadotropic hypogonadism; diabetes insipidus) (see also subsections: ***short stature***; ***delayed puberty***; ***hypothyroidism***; ***polyuria***) | |
| History | Know the symptomatic manifestations of pituitary gland dysfunction and craniopharyngioma |
| Physical | Be able to:<br>Recognize the signs of pituitary gland dysfunction on the basis of the resulting hormone deficiency or excess<br>Recognize the auxologic (ie, length/height and weight) changes related to pituitary gland dysfunction on the basis of the resulting hormone deficiency or excess |
| Diagnosis | Be able to:<br>Use laboratory tests effectively for the diagnosis of pituitary gland dysfunction on the basis of the resulting hormone deficiency or excess |
| Management | Be able to:<br>Refer a patient to a specialist |
| Diabetes Mellitus (Diabetes Mellitus Type 1/Type 2, Maturity Onset Diabetes in the Young (MODY) and Diabetes Ketoacidosis-DKA-) | |
| History | Understand the difference between Type 1, Type 2, and MODY forms of diabetes<br>Know the presentation and natural history of type 1 diabetes (eg. honeymoon period) |

## *Endocrinology (see also Metabolism)*

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| | Understand the association between type 1 diabetes and other autoimmune disorders, including celiac disease and Hashimoto thyroiditis<br>Know that complications of type 2 diabetes may be present at diagnosis<br>Know the pathophysiology of diabetic ketoacidosis (DKA) and its possible complications (eg, hypokalemia, hypoglycemia, cerebral edema, shock)<br>Know that non-compliance is a major cause of recurrent DKA<br>Know that acanthosis nigricans is a marker for insulin resistance<br>Be able to:<br>Elicit a probable diagnosis of diabetes from the history<br>Identify any family history of diabetes |
| Physical | Be able to:<br>Identify ketoacidosis (eg, shock, dehydration, Kussmal breathing)<br>Identify acanthosis nigrans<br>Suspect type of diabetes related to height and weight measurement<br>Identify lipoatrophy in a diabetic child on insulin |
| Diagnosis | Be able to:<br>Confirm the diagnosis in both asymptomatic and symptomatic patients<br>Confirm the presence of ketoacidosis<br>Select and interpret results of islet antibodies and genetic testing as indicated<br>Initiate appropriate screening tests for type 2 diabetes |

## *Endocrinology (see also Metabolism)*

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| Management | Know that cerebral edema is a complication of acute DKA even with best practice management and that it has a high mortality and morbidity<br>Be able to:<br>Explain the initial diagnosis and its management to families<br>Treat type 1 diabetes effectively to achieve good control (ie, insulin, diet, exercise and physiologic acceptance of the disease)<br>Work closely with dieticians and nurse specialists in the management<br>Counsel patients on the self-management of type 1 diabetes (eg, self testing, acute illness)<br>Provide monitoring for the prevention of long-term complications of type 1 diabetes<br>Counsel patients and families on management with sport and exercise<br>Identify psychological effects and provide support especially during 'at risk' times such as adolescence<br>Provide screening for thyroid and celiac disease at appropriate intervals<br>Manage hypoglycemia in diabetic patients<br>Formulate the treatment approaches to type 2 diabetes and MODY<br>Manage the long-term complications of type 2 diabetes<br>Manage acute DKA safely and promptly<br>Identify and manage cerebral edema<br>Consider the risks of using bicarbonate in the treatment of DKA<br>Consult with specialists in the management of severe DKA |
| Rickets (Vitamin D deficiency/dependency/resistance ) | |

## *Endocrinology (see also Metabolism)*

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| History | Know the basic etiologies of Rickets<br>- nutritional Vitamin D deficiency<br>- excess phosphate excretion (Vitamin D resistance or familial hypophosphatemic rickets);<br>- accumulation of excess acid (renal tubular acidosis)<br>- failure of hydroxylation of vitamin D (chronic renal failure)<br>Know that rickets may develop in rapidly growing premature infants with low intake of either calcium of phosphorus<br>Understand the effects of vitamin D deficiency in children of various ages<br>Know the recommended daily allowance of vitamin D<br>Understand the inheritance of vitamin D resistance rickets<br>Be able to:<br>Detect features in the history that may pre-dispose to the development of rickets (eg, genetic, dietary, renal disease) |
| Physical | Be able to:<br>Recognize the clinical signs of rickets (eg, leg, wrist, and rib deformities)<br>Recognize the auxologic (ie, length/height and weight) changes in rickets |
| Diagnosis | Be able to:<br>Interpret the radiologic findings in rickets<br>Select and interpret initial investigations to determine the cause of rickets<br>Select and interpret further investigations as appropriate |

## *Endocrinology (see also Metabolism)*

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| Management | Be able to:<br>Treat vitamin D deficiency rickets<br>Formulate the treatment approach of a child with vitamin D resistant rickets (familial hypophosphatemic rickets) consulting with specialists as appropriate<br>Counsel patients on the appropriate management of either Vitamin D deficiency, dependency or resistant rickets |
| Metabolic Syndrome (MS) | |
| History | Know the risk factors and parameters used in defining the metabolic syndrome in children<br>Know the causes of the metabolic syndrome<br>Know that the prevalence of the MS in the pediatric general population is between 2.5% and 5%<br>Know that the prevalence of the MS in the pediatric obese population is between 30% and 50%<br>Know that obesity is an important modulator of the metabolic syndrome |
| Physical | Be able to:<br>Recognize the typical clinical features associated with the metabolic syndrome<br>Recognize the auxologic (ie, length/height and weight) parameters found in the MS |
| Diagnosis | Be able to:<br>Identify the laboratory findings associated with metabolic syndrome (eg, altered glucose homeostasis, dyslipidemia and insulin resistance) |
| Management | Be able to:<br>Plan according to the laboratory findings associated with metabolic syndrome (eg, altered glucose homeostasis, dyslipidemia and insulin resistance) |

## *Endocrinology (see also Metabolism)*

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| | Refer to specialist as appropriate |

## *Gastroenterology and Hepatology*

| **General**<br>By the end of training, the resident should: | |
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| History | Be able to:<br>Conduct a detailed history including timing of introduction of various foods and the appearance of symptoms, growth curves, appetite, changes of bowel movements<br>Identify characterization of diarrhea (eg, bulky, voluminous, watery, containing blood or mucus), constipation, presence of upper GI bleeding and/or rectal bleeding, jaundice, itching, dark urine and acholic stools, and abdominal pain<br>Recognize intussusception, volvulus, malrotation , obstruction and stenosis as potential emergency situations where a surgical opinion may be required<br>Recognize the likely sites of injury following blunt abdominal trauma |
| Physical | Be able to:<br>Perform a complete physical examination including weight and height percentages, evaluation of dehydration, signs of malabsorption/malnutrition such as abdominal distension, muscle wasting<br>Recognize signs of specific vitamin and mineral deficiencies such as rosaries for Vitamin D deficiency and scanty hair for zinc deficiency<br>Recognize hepatosplenomegaly and abdominal masses<br>Recognize features in the presentation which suggest serious pathology (eg, appendicitis, intussusception, intestinal obstruction, hemolytic uremic syndrome, GI bleeding) |
| Diagnosis | Understand the role of interventional procedures and expectations from the procedure (eg, endoscopy and/or colonoscopy in the investigation of gastroenterological disorders, liver biopsy)<br>Be able to:<br>Request general laboratory evaluation including identification of infection/inflammation-stool culture and parasites, ESR, CRP, serology for celiac disease and IBD, stool volume and electrolytes (ie, osmotic vs. secretory diarrhea), anti-enterocytes antibodies exocrine pancreatic studies including sweat test |

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| | Differentiate between organic and non-organic failure to thrive<br>Formulate an age-appropriate differential diagnosis for all of the symptoms obtained during history and physical examination<br>Interpret the significance of abnormal laboratory GI studies and liver function tests |
| Management | Be able to:<br>Assess and initiate management of patients presenting with gastroenterological problems in all patient care settings (eg, acute and chronic diarrhea in different age groups, FTT, recurrent abdominal pain, constipation, encopresis, GERD)<br>Consult with specialists in a time-appropriate and effective manner<br>Formulate a management plan for a patient with severe dehydration, intestinal failure- TPN, or postoperative intestinal obstruction |

| **Presenting symptoms**<br>By the end of training, the resident should: | |
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| Acute abdominal pain | |
| History | Understand the mechanisms of injury by which drugs including nonsteroidal anti-inflammatory drugs may produce gastrointestinal symptoms<br>Know the patterns of referred visceral pain<br>Know the causes of the symptoms of acute abdominal pain<br>Be able to:<br>Evaluate location, characterization, length of the pain, relation to nausea/vomiting, diarrhea and constipation as well as fever, usage of medications<br>Obtain a family history of disorders such as Helicobacter pylori gastritis, IBD, celiac disease, FMF, hyperlipidemia |
| Physical | Be able to: |

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| | Recognize signs of abdominal pain in an infant or young child<br>Identify lobar pneumonia as a contributing factor to severe abdominal pain<br>Suspect pancreatitis in cases of blunt abdominal trauma<br>Identify peritonitis, especially in a young child with blood disorders<br>Perform rectal examination when acute appendicitis or intussusceptions is suspected |
| Diagnosis | Be able to:<br>Consider acute abdomen in very young children<br>Rule out acute abdominal pain due to 'extra ' GI origin (eg, pneumonia, UTI, Henoch Shonlein Purpura, FMF) and disorders like mesenteric lymphadenitis, Meckel's diverticulum, pancreatitis cholecystitis/cholelithiasis and peritonitis<br>Formulate an age-appropriate differential diagnosis of the acute onset of abdominal pain in a pediatric patient |
| Management | Be able to:<br>Recognize conditions which require urgent intervention (eg, intussusception, pyloric stenosis, GI bleeding)<br>Consult with an appropriate specialist |
| Chronic abdominal pain | |
| History | Know the diseases that suggest organic disorders (eg, H pylori peptic disease, celiac disease, IBD and lymphoma)<br>Know which features suggest that supportive care rather than investigation is needed<br>Be able to:<br>Identify possible biological, psychological, and social contributing factors for chronic or recurrent abdominal pain |
| Physical | Be able to:<br>Perform complete physical examination on a child with chronic abdominal pain |

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| | Recognize the clinical manifestations of functional chronic recurrent abdominal pain<br>Recognize features in the presentation that suggest the importance of different etiologies |
| Diagnosis | Be able to:<br>Formulate the differential diagnosis of recurrent abdominal pain in children at different developmental ranges<br>Plan the evaluation of a patient with chronic recurrent abdominal pain<br>Identify the diseases that suggest an organic disorder (eg, H pylori peptic disease, celiac disease, IBD lymphoma, parasitic infestation and lead poisoning) |
| Management | Be able to:<br>Plan the management of patients with chronic recurrent abdominal pain<br>Provide the main management, which is typically supportive care<br>Consider child protection issues if appropriate<br>Refer appropriately to a behavioral therapist when appropriate |
| Constipation/encopresis (see also ***Psychosocial***) | |
| History | Understand the importance of knowing the timing of onset (ie, after weaning diet has started, after a successful toilet training)<br>Understand the relevance of predisposing conditions (eg, celiac disease, hypothyroidism, neurodisability, psychosocial problems) |
| Physical | Be able to:<br>Identify the clinical manifestations of Hirschsprung disease and the rarer motility disorders such as idiopathic intestinal pseudo-obstruction syndrome<br>Recognize the signs and symptoms of fecal overflow incontinence<br>Evaluate anal tone |
| Diagnosis | Be able to: |

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| | Formulate a differential diagnosis for constipation in a young child<br>Distinguish between simple constipation and those caused by organic disease (eg, Hirschsprung disease, motility disorders and others) in the newborn period and beyond<br>Utilize rectal biopsy, unprepared barium enema, and anal manometry when appropriate |
| Management | Know the action of laxatives, stool softeners, and lubricants<br>Be able to:<br>Manage simple constipation with and without soiling<br>Refer for behavioral intervention when necessary<br>Advise on dietary manipulation<br>Consult with appropriate specialists as needed |
| Acute vomiting | |
| History | Understand the significance of bilious vomiting<br>Understand the presence of inflammation/infection, fever, diarrhea in relation to the introduction of new food<br>Understand that vomiting may be a symptom of a systemic illness |
| Physical | Know the role of vomiting in the clinical presentation of acute gastroenteritis<br>Be able to:<br>Recognize the specific signs and symptoms of dehydration, electrolyte imbalance and acid/base imbalance<br>Recognize the clinical situations in which duodenal atresia may occur |
| Diagnosis | Know the causes of acute vomiting<br>Be able to:<br>Formulate an age-related differential diagnosis of vomiting (eg, pyloric stenosis, food allergy)<br>Evaluate a young infant with projectile vomiting<br>Recognize the clinical findings of pyloric stenosis |

## *Gastroenterology and Hepatology*

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| Management | Be able to:<br>Plan the management of a newborn infant with bilious vomiting<br>Evaluate and manage children at varying ages with the acute onset of vomiting with obstruction<br>Plan the initial management of an infant or child with duodenal atresia |
| Chronic vomiting | |
| History | Recognize that regurgitation is physiologic in a significant number of infants<br>Be aware of the characteristics of bulimia<br>Be able to:<br>Determine if vomiting is cyclic<br>Conduct a thorough family history (eg, chronic disorders, IBD, celiac, migraine) |
| Physical | Be able to:<br>Identify the specific signs and symptoms of dehydration, electrolyte imbalance and acid/base imbalance, and growth retardation |
| Diagnosis | Be able to:<br>Differentiate between rumination and regurgitation<br>Consider peptic disease, including esophagitis, anatomical abnormalitys in the gut, celiac disease and inflammatory bowel disease<br>Evaluate a child with recurrent cyclic vomiting<br>Decide when endoscopy is appropriate for diagnosis and treatment |
| Management | Be able to:<br>Plan the treatment of chronic vomiting |
| Diarrhea | |
| History | Know that colitis in a breast-fed infant is a possible manifestation of food allergy secondary to allergens in the |

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| | mother's diet<br>Know that malnutrition, chronic infection, systemic disease, and immunodeficiency are predisposing factors to the development of diarrhea<br>Know the role of medications especially antibiotics in diarrhea<br>Know that fecal impaction can result in paradoxical diarrhea<br>Know the common etiologic agents of infectious diarrhea in children<br>Know that Cryptosporidium can be a cause of chronic diarrhea in a non-immuno-compromised host<br>Understand that pseudomembranous colitis can be a complication of antibiotic therapy<br>Understand the mechanism of lactase deficiency and recognize the incidence of lactase deficiency in different ethnic groups<br>Understand that extremely low fat diets, sorbitol, fruit juices, and excessive water consumption may produce chronic diarrhea<br>Understand the scientific principles for oral and intravenous fluid therapy<br>Be able to:<br>Consider geographical, socioeconomic, and ethnic background in the history of diarrhea<br>Identify the history suggestive of milk and other protein intolerance<br>Obtain data on the consistency of the stool, presence of mucous, blood and/or pus |
| Physical | Be able to:<br>Evaluate a growth chart<br>Recognize the specific signs and symptoms of dehydration, electrolyte imbalance, and acid/base imbalance<br>Recognize the signs and symptoms of enteropathogenic Escherichia coli infection<br>Recognize the clinical signs and laboratory findings associated with Escherichia coli 0157:H7 infection |
| Diagnosis | Be able to: |

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| | Differentiate between osmotic and secretory diarrhea<br>Identify the clinical manifestations of Giardia lamblia (giardiasis)<br>Formulate the differential diagnosis of noninfectious intractable diarrhea in infancy<br>Recognize that poor growth, fever, and melena are incompatible with the diagnosis of chronic nonspecific diarrhea<br>Plan the initial evaluation of an infant with protracted diarrhea |
| Management | Know that antidiarrheal medications are contraindicated for children<br>Understand the importance of providing enteral nutrition, including semi-elemental or elemental diet, in treating protracted diarrhea<br>Be able to:<br>Implement local isolation policies<br>Institute oral and intravenous fluid therapy as appropriate<br>Plan treatment for a patient with Escherichia coli diarrhea<br>Plan the management of lactase deficiency<br>Explain to parents the diagnosis and prognosis of chronic nonspecific diarrhea of early childhood (ie, toddler's diarrhea) |
| Hepatomegaly | |
| History | Know the underlying etiology and pathology of hepatomegaly in inflammatory/infectious hepatitis (eg, viral hepatitis, autoimmune hepatitis) metabolic disorders, tumors, liver cirrhosis and portal hypertension<br>Know the significance of simultaneous splenomegaly and hepatomegaly<br>Know the significance of hepatomegaly in the neonatal period<br>Understand the involvement of the liver in systemic disorders<br>Be able to: |

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| | Determine if the child has been or is jaundiced<br>Determine color of urine and stool for the past X days |
| Physical | Be able to:<br>Recognize age-related changes of the liver during physical examination<br>Identify the signs and symptoms associated with portal hypertension<br>Recognize systemic signs/symptoms suggestive of chronic liver disease (ie, palmar erythema, Caput Meduzae) |
| Diagnosis | Understand the importance of splenomegaly in making the diagnosis<br>Be able to:<br>Evaluate a child with hepatomegaly/splenomegaly<br>Interpret the laboratory findings associated with liver disease<br>Collaborate with specialists for possible liver biopsy<br>Consider metabolic disorders, especially in cases of accompanied vomiting and neurologic disturbances |
| Management | Be able to:<br>Develop a plan for managing hepatomegaly |
| Jaundice | |
| History | Understand the age-related differences in bilirubin metabolism (ie, increased erythrocyte turnover and decreased intracellular metabolism and excretion in the newborn infant)<br>Know the metabolic diseases that can lead to conjugated hyperbilirubinemia in the neonatal period<br>Know that neonatal sepsis is a possible cause of conjugated and/or unconjugated hyperbilirubinemia<br>Know that congenital hypothyroidism is a possible cause of unconjugated hyperbilirubinemia<br>Know that cholecystitis in children can be a cause of jaundice<br>Be able to: |

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| | Obtain information regarding the color of the urine and stool<br>Query about breast-feeding jaundice |
| Physical | Be able to:<br>Recognize the typical clinical presentation of a child with Gilbert syndrome<br>Recognize the typical signs and symptoms of biliary atresia versus neonatal hepatitis<br>Recognize the signs and symptoms of a choledochal cyst and infectious hepatitis |
| Diagnosis | Understand the importance of early diagnosis of biliary atresia for better prognosis with surgical intervention<br>Understand the importance of early diagnosis of metabolic or endocrine disorders (eg, galactosemia, hypothyroidism) for better prognosis<br>Be able to:<br>Appropriately request diagnostic studies to detect hemolytic diseases are necessary in a full-term infant who becomes clinically icteric during the first day after birth<br>Utilize the appropriate diagnostic tests to establish the cause of conjugated vs. unconjugated hyperbilirubinemia<br>Formulate a differential diagnosis of infectious causes of jaundice in an infant<br>Utilize the diagnostic tests for biliary atresia vs. neonatal hepatitis<br>Evaluate a 2-day-old and a 14-day-old infant with jaundice |
| Management | Be able to:<br>Plan the initial management of a patient who has obstructive jaundice<br>Plan the management of biliary atresia (eg, Kasai operation) |
| Gastrointestinal bleeding | |
| History | Know that esophageal varices may first present with upper gastrointestinal bleeding<br>Know the importance of alcohol-induced gastritis in adolescents |

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| Physical | Be able to:<br>Identify bleeding from anal fissures, intussusceptions, Meckel diverticulum, and polyps<br>Perform a thorough anal examination in the evaluation of rectal bleeding<br>Evaluate for the presence of hepatosplenomegaly |
| Diagnosis | Be able to:<br>Determine the age-related differential diagnosis for rectal bleeding<br>Differentiate upper versus lower gastrointestinal bleeding<br>Evaluate a patient with upper gastrointestinal bleeding<br>Plan the appropriate evaluation for a patient who has blood in vomitus and/or stool<br>Distinguish among the etiologies of occult blood and bright red blood per the rectum (eg, intussusception, Meckel's diverticulum and polyps)<br>Formulate the differential diagnosis of vomiting "coffee-ground" looking material<br>Formulate the differential diagnosis of vomitus that tests positive for occult blood<br>Formulate the differential diagnosis of vomiting with bright red blood<br>Use a nasogastric tube to establish the source of gastrointestinal bleeding when appropriate<br>Plan the evaluation of a young child with melena and hemodynamically significant blood loss<br>Utilize gastro-colonoscopy and capsule endoscopy to diagnose GI bleeding |
| Management | Be able to:<br>Collaborate effectively with specialists<br>Manage alcohol-induced gastritis in adolescents<br>Manage the hemodynamically unstable child with GI bleeding |
| Abdominal distention (see subsections ***Diarrhea***; ***Malabsorption***/see also ***Critical Care in Neonates: Intenstinal Obstruction***) | |

## *Gastroenterology and Hepatology*

| **Specific diseases**<br>By the end of training, the resident should: | |
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| Gastroesophageal reflux | |
| History | Know the range of presentations of gastroesophageal reflux and oesophagitis in otherwise well infants, children, and disabled children |
| Physical | Be able to:<br>Recognize the symptoms of complications of gastroesophageal reflux (eg, poor growth, pain, anemia, dystonic movements)<br>Recognize the association between gastroesophageal reflux and respiratory symptoms<br>Recognize the range of signs and symptoms associated with gastro-esophageal reflux and esophagitis |
| Diagnosis | Be able to:<br>Evaluate and diagnose a patient with gastroesophageal reflux |
| Management | Be able to:<br>Plan the treatment for complicated and uncomplicated gastroesophageal reflux<br>Advise parents of the prognosis of gastroesophageal reflux<br>Manage mild and moderate gastro-esophageal reflux and recognise when to refer |
| Appendicitis | |
| History | Know that appendicitis is an important cause of acute abdominal pain and is the most common condition requiring emergency surgery<br>Know that the location of the abdominal pain in appendicitis can vary and/or change |
| Physical | Be able to:<br>Perform and interpret a rectal exam as a mandatory procedure whenever appendicitis is suspected |
| Diagnosis | Be able to:<br>Use available laboratory evaluations (eg, ultrasound) to ensure proper diagnosis |

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| Management | Know when to refer for surgical opinion |
| Cholecystitis, cholelithiasis | |
| History | Know the risk factors associated with the development of cholelithiasis<br>Be able to:<br>Recognize the presence of cholecystitis in infancy and childhood |
| Physical | Be able to:<br>Recognize jaundice, alcoholic stool/dark urine |
| Diagnosis | Be able to:<br>Use available laboratory evaluations (eg, ultrasound) for making diagnosis |
| Management | Be able to:<br>Refer for a surgical opinion when necessary |
| Pancreatitis | |
| History | Know the risk factors associated with main causes of pancreatitis<br>Be aware that pancreatitis can be caused by physical trauma including child abuse<br>Be able to:<br>Inquire about a family history of recurrent pancreatitis, cystic fibrosis, and metabolic disorders and medications |
| Physical | Be able to:<br>Identify the signs and symptoms of acute pancreatitis in children |
| Diagnosis | Be able to:<br>Use available laboratory evaluations (eg, x-Ray, ultrasound) when making diagnosis<br>Formulate a differential diagnosis for chronic or recurrent pancreatitis in children |
| Management | Be able to: |

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| | Refer for surgical opinion when necessary |
| Breast-milk jaundice | |
| History | Know that a baby with breast-milk jaundice should be healthy<br>Know that breast-milk jaundice is unconjugated hyperbilirubinemia<br>Understand that breast-feeding is the most frequent cause of exaggerated unconjugated hyperbilirubinemia in the neonatal period<br>Know that sepsis, galactosemia, and endocrine disorders can be readily diagnosed in the neonate with conjugated hyperbilirubinemia<br>Know that breast-feeding does not cause conjugated hyperbilirubinemia<br>Be able to:<br>Rule out hypothyroidism and sepsis when the neonate appears sick |
| Physical | Know that physical examination should be unremarkable with the exception of the jaundice |
| Diagnosis | Be able to:<br>Formulate the diagnosis based upon information gained through the history and physical examination |
| Management | Be able to:<br>Prescribe proper management options (eg, frequent breast-feeding, rooming-in, adequate maternal fluid intake) |
| Chronic liver disorders | |
| History | Understand the typical clinical course of Wilson disease, cystic fibrosis, liver disease due to alpha-1 antitrypsin deficiency, and chronic autoimmune hepatitis |
| Physical | Be able to:<br>Recognize the typical signs and symptoms of Wilson disease, cystic fibrosis, liver disease due to alpha-1 antitrypsin deficiency, and chronic autoimmune hepatitis |
| Diagnosis | Be able to: |

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| | Identify and describe the multiple etiologies of chronic autoimmune hepatitis in an older child |
| Management | Know the immediate and long-term complications of hepatitis<br>Be able to:<br>Consult effectively with specialists |
| Polyps | |
| History | Be able to:<br>Identify children at risk for inherited polyposis syndromes that carry a risk of colon cancer and recommend appropriate screening<br>Recognize the benign feature of the juvenile polyps |
| Peptic ulcer disease | |
| History | Know the risk factors for ulcer disease in childhood |
| Physical | Be able to:<br>Conduct a thorough physical examination<br>Recognize the symptoms of dyspepsia in a child with recurrent abdominal pain |
| Diagnosis | Be able to:<br>Use proper methods for diagnosing Helicobacter pylori infection<br>Use gastroscopy for assisting in making the diagnosis |
| Management | Understand the mechanisms of action and indications for H2 receptor antagonists and proton pump inhibitors in ulcer disease<br>Be able to:<br>Recommend triple treatment to eradicate Helicobacter pylori infection as appropriate<br>Appropriately manage gastritis when it is a clinical manifestation of Helicobacter pylori infection |
| Esophageal disorders (including trauma) | |

## *Gastroenterology and Hepatology*

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| History | Know that acid regurgitation (due to GER) is most the common cause of esophagitis<br>Know that eosinophilic esophagitis ia a common cause of esophagitis<br>Understand that corrosive esophageal burns after alkali ingestion can occur in the absence of mouth burns |
| Physical | Be able to:<br>Identify the signs and symptoms of esophageal trauma<br>Identify the symptoms of an esophageal foreign body |
| Diagnosis | Be able to:<br>Appropriately use gastroscopy, biopsies, and X-rays to make a diagnosis |
| Management | Be able to:<br>Plan the treatment of an Esophageal foreign body, GED, motility disorders, and eosinophilic esophagitis |
| Malabsorption | |
| History | Know the age-related gastrointestinal signs and symptoms of cystic fibrosis<br>Understand the association of hepatobiliary disease with cystic fibrosis and terminal ileitis<br>Know that Shwachman syndrome is a cause of pancreatic insufficiency<br>Know that fat malabsorption can be due to chronic liver disease, biliary atresia, cystic fibrosis , Crohn's disease and/or congenital intestinal lymphangiectasia<br>Understand that sucrase isomaltase deficiency can be a cause of carbohydrate malabsorption disorder (but not lactase deficiency)<br>Know that short gut syndrome can be a cause of malabsorption<br>Know the foods in which gluten can be found<br>Understand the mechanism of malabsorption in patients with cystic fibrosis compared with the mechanism of malabsorption in patients with celiac disease |
| Physical | Be able to: |

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| | Identify the clinical manifestations of disorders of the small bowel such as celiac disease<br>Identify the signs and symptoms of malabsorption as a result of intestinal, liver, and exocrine pancreatic insufficiency<br>Recognize the adverse effects of chemotherapeutic drugs on intestinal function<br>Recognize the clinical situations in which bacterial overgrowth may play a role in malabsorption |
| Diagnosis | Know that the diagnosis of celiac disease depends on serology, characteristic small intestinal histopathologic findings, and response to a gluten-free diet<br>Be able to:<br>Use the appropriate laboratory tests to diagnose malabsorption<br>Formulate a differential diagnosis for malabsorption at various ages |
| Management | Be able to:<br>Implement treatment for the different types of malabsorption<br>Understand the role of pancreatic enzymes in the treatment of pancreatic exocrine insufficiency<br>Appropriately use medium-chain triglyceride oil in the management of fat malabsorption<br>Initiate proper nutritional investigations and assessments<br>Consult effectively with dieticians and specialists in management of this condition |
| Inflammatory bowel disease (Crohn's) | |
| History | Know that patients with Crohn's disease and UC may have growth failure<br>Know that recurrent aphthous oral lesions and other extraintestinal signs (eg, arthritis, unusual skin rashes) can be a manifestation of Crohn's disease |
| Physical | Be able to:<br>Identify the clinical manifestations of Crohn's disease and UC<br>Identify chronic peri-anal lesions as an early sign of Crohn's disease |

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| | Distinguish the manifestations of Crohn's disease from those of ulcerative colitis |
| Diagnosis | Be able to:<br>Plan the initial evaluation of a patient with suspected inflammatory bowel disease including laboratory work up, X-rays, endoscopy<br>Formulate the differential diagnosis of acute colitis in an adolescent<br>Distinguish the clinical course of Crohn's disease from those of ulcerative colitis |
| Management | Be able to:<br>Plan the management of a patient with severe colitis (ie, fever, hypoalbuminemia, and anemia) and FTT<br>Consult with the gastroenterologist as appropriate |

## *Hematology*

| **General**<br>By the end of training, the resident should: | |
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| History | Be able to:<br>Identify the presentation of common hematologic disorders<br>Identify children with a family history of hematologic disorders (eg, hemophilia, bleeding complications, hemoglobinopathy, hemolytic disease) that may also be at risk and require screening or evaluation<br>Identify children with a family history of excessive cancers that may also be at risk and require screening or evaluation<br>Identify features in the presentation which suggest serious pathology or child abuse |
| Physical | Be able to:<br>Recognize the signs of common hematologic disorders<br>Distinguish between bruising due to thrombocytopenia and normal bruising in an active child<br>Recognize palpable bruises or bruises in areas not exposed to trauma as distinctly abnormal |
| Diagnosis | Know that child abuse may be a cause of bruising in a child with a normal platelet count<br>Know that vasculitic disorders may be a cause of bruising or purpura in a child with a normal (or increased) platelet count<br>Be able to:<br>Recognize the normal variation in hemoglobin concentration and mean corpuscular volume during childhood<br>Recognize the importance of peripheral blood smear as a cost-effective screening test in hematology<br>Interpret the reticulocyte count as it usually distinguishes between disorders of erythrocyte production and those of erythrocyte destruction<br>Perform test of bleeding time to evaluate platelet and blood vessel function |

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| | Formulate the differential diagnosis of a patient with a purpuric rash or bleeding<br>Perform a bone marrow aspirate in the evaluation of a child with multiple pancytopenias |
| Management | Be able to:<br>Manage acute bleeding in a child with clotting dysfunction<br>Use genetic counseling services and consult specialists appropriately |

| **Erythrocyte disorders**<br>By the end of training, the resident should: | |
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| General Anemia | |
| History | Be able to:<br>Identify features in the history that suggest underlying anemia or anemia of chronic disease (eg, growth failure, poor weight gain)<br>Identify potential consequences of anemias<br>Obtain a detailed family history to detect hereditary anemias |
| Physical | Be able to:<br>Identify signs of anemia in acute and chronic presentations<br>Identify the key findings in patients with hemolytic anemias (eg, jaundice, pallor, and splenomegaly)<br>Identify hepatomegaly and adenopathy in infiltrative disorders |
| Diagnosis | Be able to:<br>Identify and discuss the causes of anemia<br>Perform complete blood count with differential, platelet count, red blood cell indices, and reticulocyte count in all cases of anemia<br>Determine severity of anemia through interpretation of hemoglobin and hematocrit level<br>Identify physiologic anemia of infancy and understand that further laboratory evaluation is unnecessary |

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| | Assess morphology of RBCs on the peripheral blood smear and look for abnormalities in white blood cells and platelets<br>Appropriately utilize investigations to differentiate between anemias<br>Determine reticulocyte production index (RPI), which corrects reticulocyte count for degree of anemia, to indicate whether the bone marrow is responding appropriately<br>Consider iron deficiency and thalassemia minor in the diagnosis as they are the most common causes of a microcytic anemia<br>Appropriately use laboratory studies to determine the causes of hemolytic anemia<br>Identify serious underlying pathology |
| Management | Be able to:<br>Initiate urgent therapeutic intervention, especially the use of packed RBC transfusion; these should be dictated by the extent of cardiovascular or functional impairment more than the absolute level of hemoglobin<br>Counsel parents about hereditary anemias<br>Explain screening for the thalassemia or sickle cell trait to parents |
| Nutritional anemias | |
| Iron deficiency | |
| History | Know the causes of iron deficiency anemia including poor diet, bleeding, and malabsorption<br>Know that dietary deficiency is the most common cause of iron deficiency anemia in young children<br>Know that cow's milk contains very little bio-available iron and that an infant with iron deficiency often drinks large amounts of cow's milk<br>Know the population and ages at risk for developing iron deficiency anemia<br>Know that iron deficiency in infancy may be associated with later cognitive deficits and poor school performance<br>Be able to<br>Identify factors in the history which may have predisposed to the development of dietary iron deficiency |

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| | anemia<br>Identify non-hematologic effects of anemia such as behavior and learning disturbances<br>Identify CNS manifestations of iron deficiency such as apathy, irritability, and poor concentration |
| Physical | Be able to:<br>Recognize clinical anemia |
| Diagnosis | Be able to:<br>Diagnose iron deficiency anemia<br>Determine stages in development of iron deficiency anemia<br>Perform a therapeutic trial of iron as it is the best diagnostic study for iron deficiency in an otherwise healthy child, provided the response is documented<br>Differentiate between iron deficiency and thalassemia traits |
| Management | Know that intramuscular iron injections or erythrocyte infusions should NOT be administered to the child with routine nutritional iron deficiency<br>Know that treatment with oral iron may need to be continued for several months after the hemoglobin concentration has returned to normal<br>Be able to:<br>Manage iron deficiency anemia<br>Counsel parents about preventing dietary iron deficiency<br>Prescribe appropriate treatment to correct iron deficiency anemia<br>Take appropriate measures to prevent iron deficiency in breastfed infants after age of 6 months<br>Counsel parents that bottle-fed infants should receive an iron-containing formula until 12-months of age<br>Counsel menstruating females regarding a diet enriched with iron-containing foods |
| Vitamin B12, folic acid deficiency | |

## *Hematology*

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| History | Know that B12 deficiency may occur following small bowel resection or as a result of a maternal vegan diet in a child who is exclusively breast-fed<br>Know that ingestion of fresh goat milk as a principal source of nutrition in infancy is a cause of folate deficiency<br>Know that vitamin B12 or folate deficiency is a cause of macrocytic anemia |
| Physical | Know that vitamin B12 or folate deficiency may present with neurologic symptoms including ataxia and parasthesias<br>Be able to:<br>Recognize signs of macrocytic anemia |
| Diagnosis | Know that deficiency of vitamin B12 or folate may exist even in the absence of anemia or macrocytosis<br>Know that deficiency of vitamin B12 and folate are difficult to distinguish clinically and often coexist<br>Be able to:<br>Document the diagnosis of B12 or folate deficiency with specific measurement of serum B12 concentration or serum or erythrocyte folic acid concentrations before beginning replacement therapy<br>Interpret peripheral smear findings in macrocytic anemia |
| Management | Be able to:<br>Initiate folic acid supplementation in patients with chronic hemolytic disorders<br>Counsel families on the major natural sources of folic acid in food items |
| Hemolytic anemias | |
| Membrane disorders (eg, spherocytosis) | |
| History | Know that jaundice, dark urine, and a sudden change in exercise tolerance may indicate a hemolytic anemia<br>Know that parvovirus B19 is the most common cause of an aplastic crisis in patients with hereditary spherocytosis<br>Understand the pathogenesis of hereditary spherocytosis (HS) |
| Physical | Be able to:<br>Identify anemia, jaundice, and splenomegaly |

## *Hematology*

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| Diagnosis | Know that the presentation of HS may exist with an aplastic crisis<br>Be able to:<br>Recognize increasing pallor or jaundice in a child with hereditary spherocytosis may be a sign of an aplastic crisis that warrants monitoring of the hemoglobin concentration and reticulocyte count<br>Recognize the peripheral smear findings and the elevated MCHC in HS |
| Management | Know that splenectomy eliminates anemia, reduces reticulocytosis, and improves red cell survival, but that spherocytosis of the red cells continues<br>Know that in mild HS patients, splenectomy is not indicated, and folic acid supplementation and supportive care are the only required treatment<br>Know the role of prophylactic penicillin in hereditary spherocytosis<br>Be able to:<br>Provide appropriate therapy for a child with hereditary spherocytoisis<br>Advise on appropriate vaccines in a child with hereditary spherocytosis and other membrane disorders<br>Consult with specialists regarding the need for splenectomy |
| Enzyme abnormalities | |
| History | Know that G6PD deficiency is the most common enzymatic red blood cell disorder<br>Know that G6PD deficiency is a common X-linked disorder<br>Know the relationship of G6PD deficiency and the prevalence of malaria<br>Know the most common variants of G6PD deficiency and their ethnic distribution<br>Be able to:<br>Obtain an accurate family history to determine predisposition to G6PD deficiency<br>Identify oxidizing insults that precipitate hemolysis in G6PD deficiency |
| Physical | |

## *Hematology*

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| Diagnosis | Know that diagnosis should not be made during acute hemolysis as reticulocytes have higher enzyme activity and may lead to false normal results<br>Be able to:<br>Recognize that the sudden onset of pallor and anemia may be a manifestation of G6PD deficiency |
| Management | Be able to:<br>Explain the causes of hemolysis in patients with G6PD deficiency and how to avoid predisposing factors<br>Manage patients based on the underlying cause and severity<br>Manage hyperbilirubinemia and prevent kernicterus as one of the complications of G6PD deficiency in neonates<br>Consult with appropriate specialists |
| Hemoglobinopathies | |
| History | Know that children with sickle cell disease are particularly susceptible to death from overwhelming bacterial sepsis and require early evaluation and treatment when febrile<br>Know that acute chest pain and painful crises are common manifestations of sickle cell disease<br>Understand the association of cholelithiasis in a patient with sickle cell disease<br>Know that hydrops fetalis is a complication of severe $\alpha$-thalassemia (4 gene deletion)<br>Know that most hemoglobinopathies are not clinically obvious at birth<br>Understand the genetics and inheritance of hemoglobinopathies<br>Be able to<br>Obtain an accurate family history to determine predisposition to a hemoglobinopathy<br>Identify symptoms suggestive of aplastic crisis or CNS complications in sickle cell disease |
| Physical | Know the different crises seen in sickle cell disease (eg, hemolytic, vaso-occlusive, sequestration, aplastic)<br>Be able to: |

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| | Identify hepatosplenomegaly<br>Identify signs seen in sickle cell disease such as dactilytis and priapism |
| Diagnosis | Be able to:<br>Diagnose sickle cell disease at birth<br>Identify the findings suggestive of sequestration crisis (eg, enlarged spleen and increasing anemia)<br>Plan the diagnostic evaluation for suspected forms of thalassemia |
| Management | Understand the rationale for the use of prophylactic penicillin in children with sickle cell disease<br>Understand the role of hydroxyurea in the treatment of severe sickle cell disease<br>Be able to:<br>Manage sickle cell hemolytic crisis including safe administration of fluid and analgesia<br>Initiate immediate intervention with intravenous fluids and/or blood as the treatment for acute sequestration crisis<br>Initiate the comprehensive program for management of β-thalassemia intermedia and major when appropriate<br>Plan appropriate antibiotic regimen for female child with sickle cell disease<br>Plan appropriate immunization to minimize risk of sepsis in child with sickle cell disease<br>Manage the role of blood transfusion or exchange transfusion in patients with acute chest syndrome, sequestration crisis, and CNS involvement<br>Discuss the role of bone marrow transplantation in sickle cell disease and β-thalassemia major with parents<br>Consult with specialists as appropriate |
| Immune-mediated anemias | |
| History | Know that ABO incompatibility may cause anemia in a first-born child but that Rh incompatibility rarely does<br>Know that progressive and severe anemia may occur at 4 to 8 weeks of age in infants with ABO or Rh incompatibility |

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| | Know the clinical features of Rh and ABO incompatibility |
| Physical | Be able to:<br>Assess all neonates with jaundice in the first 3 days of life for early detection of blood incompatibilities |
| Diagnosis | Be able to:<br>Recognize pallor, jaundice, and splenomegaly as signs of autoimmune hemolytic anemia in children<br>Utilize direct and indirect Coombs tests as part of the evaluation of children with acute-onset anemia<br>Develop a systematic approach to the jaundiced newborn |
| Management | Know that corticosteroids are useful in treating autoimmune hemolytic anemia<br>Be able to:<br>Manage pallor, jaundice, and splenomegaly in children appropriately<br>Manage the complications of an erythrocyte transfusion in a child with autoimmune hemolytic anemia<br>Consult with specialists as appropriate |
| Aplastic and hypoplastic erythrocyte disorders | |
| Diamond-Blackfan syndrome (Congenital pure RBC aplasia) | |
| History | Know that this is a lifelong disorder usually presents at birth or in the first few months of life<br>Know that autosomal recessive is the mode of inheritance |
| Physical | Be able to:<br>Recognize the clinical signs of Diamond-Blackfan syndrome including short stature, webbed neck, cleft lip, and triphalangeal thumb |
| Diagnosis | Be able to:<br>Distinguish between the clinical characteristics of Diamond-Blackfan syndrome and transient erythroblastopenia of childhood and Fanconi anemia<br>Identify the hematologic features of Diamond-Blackfan syndrome including elevated fetal hemoglobin, fetal |

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| | antigen, and macrocytosis<br>Identify the bone marrow findings in this syndrome highlighting a deficiency of bone marrow precursors |
| Management | Be able to:<br>Initiate and manage corticosteroid therapy in patients who respond initially<br>Initiate and manage transfusions at 4-8 week intervals in patients not responding to corticosteroid therapy<br>Consult with specialists as appropriate |
| Transient erythroblastopenia of childhood (TEC) | |
| History | Know that TEC manifests after 6 months of age<br>Know that TEC is acquired and usually is preceded by a viral infection<br>Know that the onset of TEC as gradual whereas anemia may be severe |
| Physical | |
| Diagnosis | Be able to:<br>Identify and interpret the laboratory findings of transient erythroblastopenia of childhood<br>Distinguish between TEC and Diamond Blackfan syndrome |
| Management | Be able to:<br>Appropriately use erythrocyte transfusions in transient erythroblastopenia of childhood |
| Drug induced anemia | |
| History | Be able to:<br>Obtain an accurate drug history<br>Identify drugs that may cause hemolysis (eg, chloramphenicol and felbamate) or by toxins such as benzene |
| Physical | |
| Diagnosis | Be able to:<br>Determine reticulocyte count and reticulocyte production index (RPI) to differentiate bone marrow |

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| | suppression from hemolysis<br>Interpret direct and indirect anti-globulin (Coombs') test |
| Management | Be able to:<br>Discontinue the drug(s) most likely causing the anemia<br>Give RBCs transfusion when anemia is symptomatic |
| Anemias secondary to systemic disorders | |
| History | Be able to:<br>Identify systemic illnesses that may manifest as anemia (eg, chronic renal failure, ulcerative colitis, celiac disease, chronic liver disease)<br>Identify symptoms suggestive of anemia or chronic diseases |
| Physical | Be able to:<br>Elicit the signs of anemia and its complications |
| Diagnosis | Be able to:<br>Select investigations to determine the type of anemia |
| Management | Be able to:<br>Individualize treatment and tailor it according to the systemic disease<br>Provide appropriate supportive care until the underlying disease resolves |
| Polycythemia | |
| History | Understand why children with cyanotic congenital heart disease are vulnerable to polycythaemia<br>Know causes of neonatal polycythemia<br>Be able to:<br>Identify the symptoms of neonatal polycythemia and those in childhood |
| Physical | Be able to: |

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| | Identify the signs of polycythemia in the newborn and in childhood |
| Diagnosis | Be able to:<br>Differentiate between polycythema and benign familial polycythemia (eg, erythrocytosis)<br>Identify criteria for diagnosis of polycythemia in the neonatal period<br>Identify factors that increase blood viscosity in the newborn infant<br>Select the relevant laboratory tests indicated for diagnosis of polycythemia |
| Management | Be able to:<br>Plan treatment of polycythemia in the newborn period based on causes<br>Initiate the process of partial plasma exchange transfusion in a new born infant and in a child<br>Identify anticipated complications of polycythemia in a newborn infant and in a child |

| **Leukocyte disorders**<br>By the end of training, the resident should: | |
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| General | |
| History | Know that recurrent bacterial infections may be a manifestation of quantitative or qualitative leukocyte disorders<br>Understand the differing risks of neutropenia in different conditions and treatment regimens<br>Know the causes of leukocytosis, neutropenia, lymphopenia, lymphocytosis, eosinophilia, monocytosis, and monocytopenia<br>Know the clinical features of severe neutropenia<br>Understand the significance of fever in a neutropenic patient |
| Physical | Be able to:<br>Recognize mucosal ulcerations as a sign of neutropenia<br>Identify the physical features of severe neutropenia including extensive necrotic and ulcerative lesions in oropharyngeal and nasal tissues, skin, GI tract, vagina, and uterus |

## *Hematology*

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| Diagnosis | Understand that risk of infection is inversely proportional to the absolute neutrophil count (ANC)<br>Be able to:<br>Conduct a total leukocyte count and a leukocyte differential in order to diagnose neutropenia<br>Recognize neutropenia (neutrophil count <1000/mm3)<br>Classify neutropenia (ie, congenital vs. acquired; decreased production vs. failure to release from the bone marrow, increased margination and increased destruction)<br>Distinguish leukemoid reaction from true leukemia<br>Identify the pathologic changes observed in leukocytes with severe infections or toxic states<br>Develop a systematic approach for investigation of patients with neutropenia |
| Management | Be able to:<br>Manage febrile neutropenia following local guidelines<br>Consult with specialist services as appropriate<br>Manage the role of appropriate antimicrobials, corticosteroids, and granulocytic-macrophage colony – stimulating factor (GM-CSF) in severe neutropenia |
| Quantitative leukocyte disorders | |
| Congenital and immune-mediated neutropenia | |
| History | Be able to:<br>Obtain a complete family history |
| Physical | Be able to:<br>Identify signs relevant to each congenital form of neutropenia |
| Diagnosis | Be able to:<br>Perform the relevant laboratory tests to diagnose different forms of congenital neutropenia |
| Management | Understand that congenital neutropenia may be persistent or cyclical, and manage appropriately |

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| | Be able to<br>Consult with appropriate specialist |
| Acquired, non-immune neutropenia | |
| History | Know that children with severe neutropenia may become infected with their own skin and bowel flora<br>Understand the causes of acquired neutropenia<br>Know that infection is the most common cause of neutropenia, viral infections being the most prevalent |
| Physical | Be able to:<br>Examine for splenomegaly as a possible cause of neutropenia |
| Diagnosis | Be able to:<br>Identify neutropenia as a sign of overwhelming bacterial sepsis<br>Investigate for hypersplenism as it causes peripheral sequestration of granulocytes besides red cells and platelets |
| Management | Be able to:<br>Discontinue drug therapy if neutropenia is drug-induced<br>Understand that common viral infections may cause transient neutropenia that does not require specific treatment |
| Qualitative leukocyte disorders | |
| History | Know that a child with recurrent bacterial infections and a normal neutrophil count may have abnormal neutrophil function<br>Know the classification of leukocyte dysfunction based on motility and migration, chemotaxis, opsonization, and bacterial killing<br>Know the diseases of leukocyte dysfunction |
| Physical | Be able to:<br>Recognize clinical signs of abnormal leukocyte function (eg, periodontal disease, perirectal ulceration, |

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| | delayed umbilical cord separation) |
| Diagnosis | Be able to:<br>Initiate effective investigations relevant to each type of leukocyte dysfunction |
| Management | Know about the role of bone marrow transplantation in severe disease<br>Be able to:<br>Consult with specialists as appropriate<br>Initiate prophylactic antibiotics, ascorbic acid, appropriate treatment of infections, careful oral hygiene |

| **Platelet disorders** | |
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| Thrombocytopenia (ITP, allo and auto-immune thrombocytopenia, congenital thrombocytopenia, infection) | |
| History | Know the causes of purpura and bruising<br>Know that thrombocytopenia or functional platelet disorders may cause bruising, petechiae, epistaxis, or gastrointestinal bleeding, but rarely cause deep muscle or joint bleeding<br>Know that the most common presenting symptom of ITP is increased bruising<br>Know that persistent or severe headache as a symptom of intracranial hemorrhage in ITP<br>Understand immune mechanisms in vasculitis and in allo- and auto- immune thrombocytopaenia<br>Know that multiple siblings with neonatal thrombocytopenia suggest allo-immune thrombocytopenia<br>Be familiar with congenital causes of thrombocytopenia (eg, absent radius thrombocytopenia syndrome [TAR syndrome], Wiscott-Aldrich syndrome)<br>Know that thrombocytopenia in a newborn infant may be a sign of bacterial sepsis and, in an ill child, should lead to appropriate culture and antibiotic therapy<br>Know that the presence of thrombocytopenia in a newborn infant with microcephaly or other congenital abnormalities may be due to a congenital viral infection such as CMV or rubella |

## *Hematology*

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| | Be able to<br>Obtain a careful history to elicit possible causes of platelet disorders (eg, drug history, family history) |
| Physical | Be able to:<br>Identify thrombocytopenia and recurrent infections as signs of Wiskott-Aldrich syndrome (eg, eczematoid rash)<br>Identify signs suggestive of congenital infection (eg microcephaly, intrauterine growth retardation, hepatosplenomegaly) |
| Diagnosis | Be able to:<br>Identify thrombocytopenia ( platelet count <150,000/mm3)<br>Order a platelet count to check for thrombocytopenia in the presence of a rapidly enlarging hemangioma<br>Identify ITP as characterized by a low platelet count and normal or increased platelet production in the bone marrow |
| Management | Know that most children with acute ITP will recover in less than one year without treatment<br>Know that corticosteroids and intravenous immune globulin usually increase the platelet count in children with ITP but do not alter the natural course (ie, length of disease)<br>Know that aspirin or other drugs that interfere with platelet function in children with ITP or other quantitative or qualitative platelet disorders are contraindicated in children with thrombocytopenia or qualitative platelet defects<br>Know about the use of splenectomy for children with severe bleeding problems<br>Be able to:<br>Manage a child with uncomplicated ITP<br>Explain ITP to parents including precautions and necessary treatments<br>Explain the natural history of thrombocytopenia due to maternal ITP or allo-immune thrombocytopenia to parents usually resolves within six to 12 weeks<br>Manage transfusion of platelets to a child having significant bleeding associated with thrombocytopenia |

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| | Consult with specialists in complex or chronic cases of thrombocytopenia |
| Thrombocytosis | |
| History | Know the common causes of secondary (reactive) thrombocytosis (eg, after recovery from severe infections, in recovery phase of chemotherapy-induced thrombocytopenia, and in recovery phase of ITP)<br>Know that primary thrombocytosis is extremely rare and is usually a bone marrow/myelodysplastic disorder<br>Know the association of primary thrombocytosis with chronic myelogenous leukemia, polycythemia vera, essential thrombocytosis, and myelofibrosis with myeloid metaplasia<br>Know that an elevation of platelet count in the reactive type is usually not associated with symptoms<br>Understand the role of cytokines in reactive thrombocytosis |
| Physical | Be able to:<br>Identify signs of thrombosis |
| Diagnosis | Be able to:<br>Differentiate primary and secondary thrombocytosis |
| Management | Understand the role of anti-platelet agents including acetyl salicylic acid (ASA) and Dipyridamole |

| **Pancytopenia**<br>By the end of training, the resident should: | |
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| Decreased production | |
| Congenital (Fanconi anemia) | |
| History | Know the etiology and epidemiology of Fanconi anemia<br>Know the common presentations (eg, pancytopenia, thrombocytopenia, malignancy)<br>Know that this disorder is inherited as an autosomal-recessive trait and that there is an underlying chromosomal fragility defect |
| Physical | Be able to:<br>Identify the clinical features of Fanconi anemia if present (ie, short stature, hyperpigmentation, café-au-lait |

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| | spots, microcephaly, thumb, ear, genital and renal anomalies, and developmental delay) |
| Diagnosis | Be able to:<br>Consider acquired aplastic anemia, TAR syndrome, and leukemia in the differential diagnosis<br>Perform bone marrow assessment to rule out complications in Fanconi anemia<br>Select proper laboratory studies for diagnosis of Fanconi anemia |
| Management | Know about the role of androgen therapy<br>Know about the role of hematopoietic stem cell transplantation<br>Be able to:<br>Provide supportive therapy (eg red cell and platelet transfusions and antibiotics)<br>Consult with specialists appropriately |
| Acquired aplastic anemia | |
| History | Know the causes of aplastic anemia (eg, idiopathic, drugs, toxins)<br>Know that there may be failure of production of a single cell line initially progressing to full aplasia later<br>Be able to:<br>Obtain a careful history to elicit any predisposing factors leading to aplasia (eg, drugs) |
| Physical | Be able to:<br>Identify the signs of aplastic anemia (eg, anemia, neutropenia, and thrombocytopenia) |
| Diagnosis | Know that the absence of blasts in the peripheral blood of a patient with pancytopenia does not rule out the diagnosis of leukemia<br>Be able to:<br>Recognize reticulocytopenia as a prominent finding<br>Utilize bone marrow examination to make the diagnosis<br>Distinguish between acquired aplastic anemia and childhood leukemia |

## *Hematology*

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| Management | Understand the role of bone marrow transplantation in severe aplastic anemia<br>Be able to:<br>Provide supportive therapy<br>Manage the underlying cause (eg, removal of drugs or toxins)<br>Consult with specialists appropriately |
| Increased destruction | |
| History | Know the causes of increased destruction (eg, autoimmune destruction, hypersplenism, environmental toxins, infections) |
| Physical | Be able to:<br>Detect anemia, signs of thrombocytopenia, and neutropenia<br>Detect hepatosplenomegaly |
| Diagnosis | Know that peripheral destruction of red blood cells is associated with reticulocytosis and high reticulocyte production index (RPI) |
| Management | Be able to:<br>Manage the underlying cause(s)(eg, removal of toxins, treatment of infection)<br>Provide supportive therapy<br>Consult with specialists appropriately |

| **Coagulation disorders**<br>By the end of training, the resident should: | |
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| Congenital and acquired bleeding and thrombotic disorders (eg, Hemophilia A and B, von Willebrand disease, disseminated intravascular coagulation) | |
| History | Know the underlying defects and inheritance patterns of Hemophilia A and B<br>Know that some children with hemophilia have a negative family history for bleeding disorders |

## *Hematology*

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| | Know that excessive bleeding after circumcision may be the first sign of a congenital coagulation factor deficiency<br>Understand categorization of hemophilia dependant on factor levels and how this affects age and type of presentation (eg, spontaneous bleeding or bleeding only after trauma)<br>Know that the first manifestation of von Willebrand disease in girls may be heavy menstrual bleeding<br>Be able to:<br>Obtain a detailed family history<br>Elicit a history of spontaneous bleeding or the type of trauma leading to bleeding<br>Elicit symptoms suggestive of complications such as bleeding into muscles or joints<br>Identify headache as an important symptom of intracranial bleeding and know it requires early assessment and treatment |
| Physical | Be able to:<br>Distinguish between normal childhood bruising, bruising due to a coagulation disorder, and bruising suggestive of non accidental injury<br>Identify signs of joint abnormalities seen in severe hemophilia (eg, hemarthrosis, fixed flexion deformities)<br>Identify bleeding into closed fascial spaces as a risk for compartment syndrome |
| Diagnosis | Know that partial thromboplastin time is often normal in patients with von Willebrand disease but bleeding time is commonly prolonged<br>Be able to:<br>Utilize coagulation test (prothrombin time and partial thromboplastin time ) factor levels and bleeding time to establish a diagnosis of a bleeding disorder<br>Classify hemophilia A and B according to degree of severity using Factor level<br>Identify the need for measuring prothrombin time, partial thromboplastin time, and platelet count as part of the evaluation for disseminated intravascular coagulation in a child with sepsis and purpura |
| Management | Know to avoid femoral or jugular venipunctures in a child with hemophilia who has not received replacement |

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| | treatment<br>Understand the principles of replacement therapy (eg, plasma derived factor concentrates in coagulation and bleeding disorders for both therapy and prophylaxis)<br>Know about the use of high dose desmopressin in mild hemophilia A<br>Understand the implications of the resource limitations of factor replacement therapies<br>Be able to:<br>Properly use replacement therapy in the treatment of a patient with hemophilia or von Willebrand disease<br>Initiate careful assessment and early replacement therapy in a hemophiliac child with head trauma even in the absence of neurologic abnormalities<br>Recognize the need to urgently treat hemarthrosis in a patient with hemophilia<br>Advise families of a child with a coagulation or bleeding disorder regarding physical activities and sports participation<br>Advise families of a child with a coagulation disorder about surgical procedures (including dental)<br>Provide support to a child with a coagulation or bleeding disorder prior to surgery<br>Consult with specialists appropriately |
| Thrombophilias (congential and aquired) | |
| History | Understand the clinical presentation of thromboembolic disorders in children<br>Know that neonates, infants younger than 1 year, and teenagers are at greatest risk<br>Know that in the majority of cases these disorders are acquired or secondary to other risk factors for thrombosis such as CNS venous catheters, congenital heart disease, cancer, surgery, and SLE<br>Know that a strong family history of pulmonary emboli or deep vein thrombosis is suggestive of an inherited hypercoagulable disorder<br>Be able to:<br>Obtain a family history to elicit any suggestions of an inherited disorder |

## *Hematology*

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| Physical | Be able to:<br>Identify sites of venous and arterial thrombosis |
| Diagnosis | Be able to:<br>Select investigations known to be associated with thrombosis (eg, factor V Leidin deficiency, protein C and protein S deficiency, and antithrombin 3 deficiency) |
| Management | Understand the indications for the use of thrombolytic medications<br>Be able to:<br>Initiate immediate intervention in newborns with homozygous protein C or S deficiency who present with Purpura fulminans or cerebral or ophthalmic thrombosis<br>Initiate therapy with available anti-coagulant medications for a child with deep venous thrombosis.<br>Consult with specialists appropriately |
| Hemorrhage due to coagulopathy | |
| History | Understand that bleeding in a patient with coagulopathy may not be controllable until the coagulopathy is corrected<br>Understand that bleeding in a coagulopathic patient into an enclosed space, such as the skull, chest, or fascial compartment, is an emergency<br>Understand risk factors for nutritional vitamin K deficiency |
| Physical | |
| Diagnosis | Be able to:<br>Interpret platelet count, coagulation times, and clotting factor levels rapidly to determine the underlying cause in a bleeding, coagulopathic patient |
| Management | Understand that patients receiving large volume blood transfusions will often need replacement of clotting factors through transfusion of fresh frozen plasma and cryoprecipitate as well as platelets<br>Be able to:<br>Initiate and manage transfusion of platelets, plasma, and red blood cells in a coagulopathic, bleeding patient |

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| | Consult with specialists appropriately |

| **Transfusion medicine (including component therapy)**<br>By the end of training, the resident should: | |
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| | Understand the risks of administering blood products<br>Know the indications for irradiated blood products<br>Understand cultural issues in relation to blood products<br>Be able to:<br>Follow transfusion procedures correctly<br>Explain to patient/parents the risks and benefits<br>Appropriately manage transfusion reaction |

## *Immunology*

| **General**<br>By the end of training, the resident should: | |
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| History | Understand the basic immunology required to underpin clinical practice (eg, humoral and cellular immunity)<br>Understand the development of the immune system with age<br>Understand the pathophysiology of common disorders affecting the immune system<br>Be able to:<br>Take a relevant focused history, recognizing the symptoms and signs suggestive of an underlying immune disorder |
| Physical | Be able to:<br>Undertake a focused clinical examination and interpret the signs and symptoms |
| Diagnosis | Be able to:<br>Formulate a differential diagnoses based on physical findings<br>Select and interpret the appropriate investigations helpful for establishing a differential diagnosis<br>Recognize features in the clinical presentation or investigation findings which suggest serious pathology |
| Management | Know the broad range of treatments used in immune disorders<br>Be able to:<br>Counsel families appropriately regarding treatments<br>Consult with specialists appropriately about management<br>Involve the multi-disciplinary team and other professionals when appropriate |

| **Signs and symptoms of potential immunodeficiency**<br>By the end of training, the resident should: | |
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| History | Know that recurrent infections, rashes, or joint pain may be suggestive of an immune disorder or dysfunction |

## *Immunology*

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| | Be able to:<br>Explore, through appropriate questioning, evidence of multi-system features |
| Physical | Be able to:<br>Perform a valid, targeted, and time efficient examination relevant to the presentation and risk factors<br>Perform relevant adjunctive examinations when relevant (eg, detailed musculoskeletal examination) |
| Diagnosis | Be able to:<br>Formulate a relevant differential diagnosis using appropriate diagnostic tests |
| Management | Be able to:<br>Develop management plan for anti-microbial treatment of infections which common complicate immune disorders<br>Provide general supportive therapy when necessary (eg, nutrition and hydration)<br>Initiate specific therapeutic treatments of immune modulation in conjunction with specialists |

| **Immune deficiency disorders**<br>By the end of training, the resident should: | |
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| History | Know the causes and various clinical presentations of patients with primary and secondary immune-deficiency diseases<br>Know which medications may be associated with suppression of the immune response<br>Understand the effect of malnutrition and disease on immune development<br>Know the classification of immune-deficiencies<br>Be able to:<br>Perform a focused history in the context of immune-deficiency to guide physical examination and formulation of differential diagnosis<br>Determine factors that differentiate between primary and secondary disorders |

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| | Identify the clinical characteristics of cellular immunodeficiency present in the first few months after birth (eg, failure to thrive, chronic diarrhea, overwhelming infections with viral, bacterial, and/or opportunistic infections)<br>Identify clinical characteristics of antibody deficiency syndromes after 4 to 6 months of age (eg, severe first infections and/or chronic and recurrent bacterial infections in more than one anatomic site) |
| Physical | Be able to:<br>Perform focused clinical examination and link findings to the history to establish diagnosis<br>Identify diseases that have specific physical signs (eg, Chediak-Higashi, di George, ataxia telangiectasia) |
| Diagnosis | Know which children merit investigation for immune deficiency (eg, family history, single infection with unusual organism, multiple infections)<br>Understand the methodology and the limitations of different diagnostic tests for infection<br>Know about the use of C1 inhibitor concentrate for hereditary angio-oedema<br>Be able to:<br>Select appropriate investigations to diagnose immune-deficiencies taking into consideration the presentation and the age of the child (eg, antibody and cell mediated defects, complement deficiency, C1 inhibitor deficiency, and neutrophil defects)<br>Use radiological investigations appropriately (eg, Shwachmannn Diamond) and when to avoid them (eg, DNA repair defects)<br>Identify the atypical manifestations of common infections and the range of atypical organisms causing infection in the immune-compromised child<br>Select and interpret tests of innate immunity (eg, complement and neutrophil function tests)<br>Select and interpret appropriate investigations for evaluation of antibody function (eg, quantitative immunoglobulin concentrations, specific antibody responses to protein and polysaccharide vaccines)<br>Select and interpret appropriate investigations for evaluating cell-mediated immunity (eg, lymphocyte counts and lymphocyte function) |

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| Management | Be able to:<br>Treat appropriately active infections in the immune-compromised child<br>Prescribe appropriate anti-microbial prophylaxis in the immune-compromised child<br>Appropriately administer immunoglobulin and immune-modulatory treatments<br>Explain adverse effects associated with individual therapies and immune-prophylaxis<br>Understand which conditions are treatable with hemopoietic stem cell transplantation<br>Recognize the importance of understanding the genetic basis of immune-deficiencies and the importance of genetic counseling in disease prevention |

| **Immune deregulation syndrome** (autoimmune lymphoproliferative syndrome, chronic mucocutaneous candidiasis, polyendocrinopathy, enteropathy, and X-linked inheritance syndrome)<br>By the end of training the resident should: | |
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| History | Be able to:<br>Recognize features in the history suggestive of disorders of immune regulation (eg, lymphadenopathy, hepato- splenomegaly, and chronic infections of skin and nails) |
| Physical | Be able to:<br>Identify the presentations associated with IPEX syndrome (eg, diarrhea, insulin-dependent diabetes mellitus, thyroid disorders, eczema) |
| Diagnosis | Be able to:<br>Consult appropriate specialists to inform/determine the diagnosis |
| Management | Be able to:<br>Consult with specialists for management |

| **Care of the immune-compromised child**<br>By the end of training the resident should: |
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## *Immunology*

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| History | Know the importance of the effect of viral infections in causing immunodeficiency<br>Be able to:<br>Identify symptoms of potential infection in an immune-compromised child<br>Identify which medications a child may be taking, or have taken, that put them at risk of immunosuppression |
| Physical | Be able to:<br>Identify signs of infection<br>Identify signs of general and specific nutritional deficiencies |
| Diagnosis | Understand the methodology and the limitations of different diagnostic tests for infection |
| Management | Be able to:<br>Deliver full supportive care to parents of children with immunodeficiency<br>Advise parents of an immune-compromised child on an appropriate immunization schedule<br>Counsel parents about prevention and recognition of infections<br>Prescribe appropriate treatment for infection and prophylactic treatments<br>Counsel parents about the increase risk of malignancy in children on immunosuppressive treatment<br>Develop a treatment plan for a child with febrile neutropenia |

**Vasculitic disorders (**see ***Rheumatology)***

**HIV infection (**see ***Infectious Diseases)***

| **Auto-immune disorders (**see also ***Rheumatology)***<br>By the end of training, the resident should: | |
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| History | Know the range of auto-immune diseases including systemic lupus erythematosus, scleroderma, dermatomyositis and polymyositis, mixed connective tissue disease, and Wegener's granulomatosis |

## *Immunology*

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| | Be able to:<br>Obtain a focused history in a child presenting with features suggestive of Henoch Scholein Purpura<br>Identify features in the history which suggest a systemic autoimmune disease |
| Physical | Be able to:<br>Identify rashes associated with auto-immune disorders<br>Conduct full musculoskeletal examination and determine the extent of joint involvement |
| Diagnosis | Be able to:<br>Select and interpret appropriate tests to confirm an auto-immune systemic autoimmune rheumatic disease or vasculitides<br>Identify when a tissue diagnosis may be indicated |
| Management | Be able to:<br>Establish a short- and long-term management plan for a child with Henoch Scholein Purpura(HSP)<br>Identify features in the clinical course of HSP that suggest a worse prognosis<br>Understand the range of treatments including immune-suppression agents, monoclonal antibodies, and plasma exchange<br>Consult with an appropriate range of specialists, including neurology, ophthalmology, nephrology, and rheumatology<br>Counsel parents on the range of treatments used and their side effects |

## *Infectious Diseases*

| **Epidemiology**<br>By the end of training, the resident should: | |
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| Local (including surveillance data, outbreaks, resistance [eg, MRSA]) | |
| | Understand the causes of outbreak of infection (ie, conditions which predispose to infection) |
| | Have a working knowledge of common infectious diseases prevalent in each sub-region |
| | Know the immediate steps to take in event of a disease outbreak |
| | Understand the relevant investigative and control measures with outbreak of infection |
| | Know the common infectious diseases that are identifiable and the recommended control measures |
| Global | |
| | Understand socio-demographic factors predisposing to infectious diseases |
| | Have a background knowledge, from historical perspectives, of nations/continents that have eliminated some infectious diseases |
| | Know the epidemiology and natural history of common infections of fetus, newborn, children, and adolescents |
| Age-related | |
| | Understand age-related differences in the epidemiology of common childhood infections |
| | Understand the pathophysiology of maternal-to fetal transfer of infections and immunity |

| **General**<br>By the end of training, the resident should: | |
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| History | Understand host defense mechanisms and their pattern of development |
| | Know the causes of vulnerability to infection |
| | Know the classification of infectious agents |

## *Infectious Diseases*

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| | Understand why and how air/sea travels impact disease patterns in a sub-region<br>Be aware of conditions which predispose to infections |
| Physical | Be able to:<br>Identify the clinical manifestations of infectious diseases<br>Recognize pathognomonic signs of infections<br>Perform a physical exam appropriate for a suspected infection |
| Diagnosis | Know the appropriate microbiological method(s) to enhance diagnosis<br>Know how to ensure quality control of diagnostic methods<br>Know when special methods are required and know how to work with the relevant disciplines<br>Be able to:<br>Identify and investigate features in the presentation which suggest underlying pathology<br>Arrive at a differential diagnosis of many infectious diseases under the purview of the general pediatrician<br>Work with infectious diseases specialists to confirm diagnosis of infections outside but related to the purview of the general pediatrician<br>Correctly interpret microbiological results |
| Management | Be able to:<br>Follow local and national guidelines on notification of infectious diseases<br>Recognize indications for, and prescribe, appropriate anti-microbials for therapy and prophylaxis<br>Apply principles of infection control<br>Recognize complications of infections and need for referral to specialists |

## *Infectious Diseases*

| Septic shock | |
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| History | Know the pathogenesis of septic shock<br>Understand the pathophysiology of septic shock and its complications<br>Be able to:<br>Identify symptoms consistent with septic shock, and that symptoms may vary with age |
| Physical | Know that features of septic shock may vary with age<br>Be able to:<br>Recognize the features of septic shock and its complications,. |
| Diagnosis | Know the common pathogens responsible for septic shock in the region<br>Be able to:<br>Differentiate between septic shock, hypovolemic shock, and cardiogenic shock<br>Recognize laboratory abnormalities consistent with septic shock<br>Formulate the differential diagnosis of septic shock |
| Management | Know local and national guidelines for the management of septic shock<br>Be able to:<br>Lead the team when initiating resuscitation and treatment<br>Consult with appropriate specialists |
| Host factors, host responses, and pathogen-related determinants | |
| History | Be aware of interaction between the host and the pathogen<br>Understand socio-demographic factors that may predispose a child to particular infection |

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| | Know current antiseptic techniques |
| Physical | Be able to:<br>Perform an appropriate physical examination in order to inform the diagnosis |
| Diagnosis | Be able to:<br>Recognize treatment failure<br>Evaluate the possibility of drug resistance development in an index case<br>Recognize when a nosocomial infection is in the unit |
| Management | Know how to ensure a clean environment<br>Know the common microbes causing particular diseases and their anti-microbial sensitivity patterns<br>Know what to do in the event of an outbreak of a disease in a hospital/clinic service unit<br>Be able to:<br>Participate in strategies for reducing drug resistance<br>Monitor response to treatment(s) |
| Fever (systemic and associated organ manifestation) | |
| History | Know the common causes, onset, course, and complications of fever |
| Physical | Know the different sites and instruments of temperature measurement<br>Be able to:<br>Identify different fever patterns |
| Diagnosis | Be able to:<br>Correctly interpret temperature recordings |

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| | Differentiate between true and spurious fever<br>Evaluate a child with fever for possible underlying cause(s) |
| Management | Be able to:<br>Apply local, national, and international standards in the management of fever |
| Fever of unknown origin (FUO) | |
| History | Know the definition of FUO; how the definition differs between hospital and outpatient settings; and the differentiation of immunocompromised and immunocompetent hosts<br>Know the possible causes of FUO<br>Understand aspects of past medical history, family history, and social history that are relevant to explore |
| Physical | Be able to:<br>Recognize features in the presentation which suggest serious or unusual pathology |
| Diagnosis | Be able to:<br>Initiate investigations to establish cause |
| Management | Be able to:<br>Refer to a specialist when appropriate |
| Fever without source (infants and children) | |
| History | Know the most common pathogens causing fever without source in infants, toddlers, and children<br>Know how the child's history and exposures affect the likelihood of various pathogens (eg, immunization status, daycare attendance) |
| Physical | Be able to:<br>Identify clinical features that suggest higher risk of severe infection (eg, ill appearance, lethargy, petechiae) |

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| Diagnosis | Be able to:<br>Select appropriate diagnostic tests in evaluation of a child with fever without source, considering age, immunization status, and exposure history |
| Management | Know when antibiotic and/or antiviral therapy are appropriate prior to establishing a specific diagnosis<br>Be able to:<br>Select appropriate antibiotics or antivirals for a suspected infection |

| **Congenital infections** | |
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| History | Know the pathogens that can cause congenital infection (eg, Rubella virus, CMV, Treponema pallidum, HSV, enteroviruses, HIV)<br>Know that timing of the transmission may affect the severity of the clinical manifestations<br>Know that some congenital infections are asymptomatic at birth |
| Physical | Be able to:<br>Identify physical findings associated with congenital infections (eg, small for gestational age, microcephaly, hepatomegaly, splenomegaly, rash, thrombocytopenia, hearing loss) |
| Diagnosis | Know the appropriate specific diagnostic tests for various pathogens and that ordering "TORCH titers" rarely provides adequate results<br>Be able to:<br>Plan the diagnostic evaluation of a newborn suspected of having a congenital infection |
| Management | Know the pathogens for which treatment is available (see also section on specific pathogens) |

| **Public health considerations: prevention of infectious diseases (**see also ***Preventive Pediatrics*****)** |
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## *Infectious Diseases*

| By the end of training, the resident should: | |
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| Immunizations (including vaccination schedules locally) | |
| Management | Know the vaccines and preventable childhood diseases in the region<br>Be familiar with the routine childhood immunization programs in the locality<br>Know the adverse effects of every vaccine in the program and the immediate steps to treat<br>Be aware of factors that mitigate against successful immunization |
| In childcare centers | |
| Management | Be familiar with the risk of acquiring infections transmitted in childcare centers<br>Know that hand hygiene is the most important measure to prevent transmission of pathogens in childcare centers<br>Be able to:<br>Advise on childcare exclusion criteria for infections in children<br>Advise on which illnesses childcare exclusion is not indicated |
| Hospital and office infection control and isolation measures | |
| Management | Know the recommendations for standard precautions<br>Know the recommendations for airborne, droplet, and contact precautions and how these differ from standard precautions<br>Understand that office and hospital staff needs protection from endemic diseases in the locality via vaccination<br>Be able to:<br>Identify when airborne, droplet, and contact precautions are required |
| Infections transmitted through breast-feeding | |
| Management | Understand that human milk provides protection against many gastrointestinal and respiratory infections<br>Understand that the protection conferred is maximized by exclusive breastfeeding |

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| | Be able to:<br>Advise on absolute and relative contraindications to breastfeeding |
| Medical evacuation of internationally adopted children | |
| Management | Know the recommendations for screening for infectious diseases in internationally adopted children<br>Know that antibody tests to some vaccines are available to assist in the evaluation of immunization status of an internationally adopted child who has a history of questionable medical care<br>Know how to assess the validity of an immunization record of an internationally adopted child |
| Prevention of vector-borne diseases | |
| Management | Know the recommended measures to prevent tick-borne and mosquito-borne infections<br>Know the precautions for application of topical insect repellants in children |
| Prevention of infection associated with recreational water use | |
| Management | Know which pathogens can be transmitted by contaminated recreational water<br>Know that certain pathogens are relatively resistant to chlorination and may cause pool-associated outbreaks of acute gastroenteritis<br>Know the precautions to prevent infections associated with recreational water use |

| **Antibiotics, antivirals , antiparasites, antifungals**<br>By the end of training, the resident should: | |
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| Management | Know the classes of antibiotics and their modes of action<br>Know the pharmacology of antibiotics (ie, dosing, metabolism, elimination, and drug interactions)<br>Understand the rational use of antibiotics with a view to minimizing abuse and development of resistance<br>Know the appropriate use and major adverse effects of antivirals |

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| | Know the appropriate use and potential adverse effects of metronidazole, mebendazole, chloroquine, mefloquine, atovaquone/proguanil, and others relevant to the sub-region<br>Know the appropriate use of amphotericin B and its adverse effects (eg, hypokalemia and multisystem toxicity, especially to the kidneys)<br>Know the appropriate use of other antifungals (eg, fluconazole, griseofulvin) and their adverse effects<br>Know when monitoring of liver function is indicated in patients on anti-fungals |

| **Antimicrobial resistance**<br>By the end of training, the resident should: | |
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| Management | Understand the mechanism of drug resistance<br>Understand that extensive use of cephalosporins contributes to broad-spectrum antibiotic resistance in nosocomial pathogens<br>Know that children treated with antibiotics are at increased risk of becoming carriers of resistant bacteria<br>Know for which illnesses antimicrobial treatment is generally not indicated (eg, bronchitis, middle ear effusion of short duration, most cases of pharyngitis (unless group A streptococcus), mucopurulent rhinitis of short duration)<br>Be able to:<br>Recognize when excessive antibiotic use has contributed to antibiotic resistance in a community |

| **Infections in immunocompromising conditions** (see also ***Immunology***)<br>By the end of training, the resident should: | |
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| History | Understand the association between infections and malnutrition |

## *Infectious Diseases*

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| | Understand that neonates and children with diseases of the central nervous system may not manifest fever because the thermoregulatory center of the hypothalamus may be immature or abnormal<br>Know that children with asplenia (anatomical and functional) are susceptible to increased morbidity and mortality from infection with encapsulated organisms<br>Understand maternal, fetal, and neonatal factors predisposing to neonatal sepsis (NNS)<br>Understand risk factors for infection eg, indwelling catheters, skin breakdown and burns<br>Be able to:<br>Elicit risk factors for infection in patients with immunocompromise |
| Physical | |
| Diagnosis | Know the major infections seen in patients with cancer<br>Know the spectrum of organisms responsible for NNS in the locality<br>Know the major infections seen in patients with skin lesions and burn injury<br>Know the pathogens commonly associated with central and urinary catheter infections<br>Be able to:<br>Select the necessary investigations to make the diagnosis |
| Management | Know that an accepted antibiotic regimen for a patient with cancer who has fever and neutropenia should be effective against Pseudomonas aeruginosa and staphylococci<br>Know that the diagnosis of pneumonia in an immunocompromised host may require aggressive procedures, including bronchoscopy<br>Know which measures to use to control infections in burns injury<br>Be aware of appropriate community management of NNS |

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| | Be able to:<br>Plan the treatment of a patient with a central catheter infection<br>Know the indications for immunosuppressant drug therapy<br>Know the spectrum of infection in children on Immunosuppressant drugs (ISD)<br>Know the appropriate antibiotic therapy for NNS in the unit |

| **Specific viral pathogens** (see also ***Preventive Pediatrics***) | |
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| Varicella zoster | |
| History | Understand the relationship between varicella and herpes zoster, and know that both are caused by the same virus<br>Know the epidemiology of varicella and herpes zoster: mode of transmission, incubation period, period of communicability of varicella<br>Know that varicella in an immunocompromised host may result in severe disease |
| Physical | Be able to:<br>Recognize the clinical manifestations of varicella and herpes zoster<br>Recognize the manifestations of varicella infections acquired in utero |
| Diagnosis | Be able to:<br>Use appropriate microbiological methods for diagnosis (eg, virology, serology)<br>Understand the use of rapid test staining for infection control (eg, PCR and immuno-histochemical)<br>Utilize varicella IgG in determining the immune status of children with unknown or uncertain history of varicella infection |
| Management | Know the control measures for varicella and herpes zoster |

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| | Understand why varicella-zoster immune globulin is not recommended for normal infants over 2 days of age who are exposed to chickenpox<br>Be able to:<br>Prescribe varicella-zoster immune globulin within appropriate time frame (ie, within 96 hours after exposure to varicella)<br>Prescribe varicella-zoster immune globulin and varicella vaccine in patients exposed to varicella appropriately<br>Prescribe antiviral treatment of varicella zoster infections in normal and immunocompromised hosts appropriately |
| Measles (rubeola) | |
| History | Know the route and mode of transmission of measles<br>Know the predisposing factors to measles<br>Be able to:<br>Recognize the typical prodromal features of measles<br>Recognize the clinical course of measles infection |
| Physical | Be able to:<br>Recognize the typical and atypical signs of measles<br>Identify the signs of complications of measles |
| Diagnosis | Know the differential diagnoses of measles (eg, Rubella, Roseola infantum, Echovirus, infectious mononucleosis, Kawasaki disease, drug rash)<br>Be able to:<br>Recognize the various types of measles |
| Management | Know the control measures for measles: isolation (airborne pre-cautions), care of exposed personnel, immunization |

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| | Know the specific indications for antibiotic therapy in measles<br>Understand why measles vaccine is not presently recommended before six (6) months<br>Be able to:<br>Administer intramuscular immune globulin to immunocompromised patients and infants who are closely exposed to measles but have not been immunized |
| Human immunodeficiency virus (HIV) | |
| History | Know that the spread of HIV/AIDS occurs by sexual contact or contact with infected blood and body fluids<br>Know that abstinence and/or the use of a condoms are the best forms of preventing sexual transmission of HIV/AIDS<br>Know the epidemiology of human immunodeficiency virus infection (ie, mode of transmission, incubation period, and period of communicability)<br>Know the means of maternal transmission of HIV to her infant (eg, vaginal delivery, breast-feeding, transplacentally, and intrapartum)<br>Know that children with untreated HIV/AIDS have more frequent common infections (eg, otitis media, diarrhea) as well as opportunistic infections<br>Be able to:<br>Recognize the modes of presentation of HIV disease in children at different ages<br>Recognize complications of HIV/AIDS in a child |
| Physical | Be able to:<br>Identify clinical signs that together with the history suggest untreated HIV/AIDS (eg, failure to thrive)<br>Identify the clinical features suggestive of an opportunistic infection<br>Elicit signs suggestive of HIV encephalopathy |

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| | Identify features of non-Hodgkin lymphoma and Kaposi Sarcoma |
| Diagnosis | Know the effect of a mother's HIV-positive status on her infant's HIV test<br>Understand the use and limitations of ELISA and PCR for making the diagnosis<br>Know that the differential diagnosis of HIV with respiratory difficulties should include lymphoid interstitial pneumonitis and infection<br>Understand the use of CD4 and RNA viral load in monitoring disease progression<br>Be able to:<br>Develop an appropriate differential diagnosis in a child with HIV and respiratory difficulty<br>Conduct a sensitive pre-test discussion with caregivers about the value of diagnosis<br>Use the most appropriate screening test for HIV infection in children older than 18 months of age (ie, HIV titer)<br>Use the preferred method of diagnosis of HIV infection in those less than 18 months of age (ie, nucleic acid amplification test) |
| Management | Understand strategies to reduce transmission of HIV in well resourced and resource-limited settings<br>Know that cesarean delivery and treatment of an HIV-positive mother with antiretroviral drugs decreases the risk of transmission of virus to her infant<br>Know the feeding and immunization options available to infants exposed to/infected by HIV<br>Know the side effects of antiretroviral treatments and the particular problems of administering these drugs to children<br>Understand the implications of the development of resistance to antiretroviral therapy<br>Be able to:<br>Counsel families and other professionals on the transmission of HIV and post-exposure prophylaxis |

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| | Plan the management of an infant whose HIV status is unknown<br>Provide specific advice to HIV infected mothers (eg, breast feeding routines)<br>Use the WHO classification of HIV disease and the management guide therein<br>Treat opportunistic infections and nutritional problems commonly seen in children with HIV<br>Advise on immunization in children with HIV<br>Collaborate with appropriate specialists in management of patients with HIV/AIDS, including antiviral treatment |
| Respiratory syncytial virus | |
| History | Know the epidemiology of respiratory syncytial virus (ie, mode of transmission, incubation period, period of communicability, age of onset, peak season)<br>Know that respiratory syncytial virus is the most common cause of lower respiratory infections in infancy<br>Be able to:<br>Identify patients at high risk for morbidity and mortality from respiratory syncytial virus infection (eg, those with congenital heart disease, bronchopulmonary dysplasia, and prematurity/low birth weight)<br>Identify high-risk patients who may benefit from prophylaxis |
| Physical | Be able to:<br>Recognize the clinical manifestations of respiratory syncytial virus infection (eg, bronchiolitis) |
| Diagnosis | Be able to:<br>Use the laboratory tests for the diagnosis of respiratory syncytial virus (eg, culture, antigen detection) |
| Management | Know the control measures for respiratory syncytial virus infection (eg, isolation of hospitalized patients, proper hand washing)<br>Know the indications for monoclonal RSV IgG |

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| | Be able to:<br>Plan the management of respiratory syncytial virus infection |
| Rotavirus | |
| History | Know the epidemiology of rotavirus (ie, mode of transmission, incubation period, age of onset, peak season) |
| Physical | Be able to:<br>Recognize the clinical manifestations of rotavirus infection (eg, gastroenteritis with severe dehydration) |
| Diagnosis | Know that a specific diagnosis is not necessary to initiate management<br>Be able to:<br>Use best tests for the diagnosis of rotavirus infection (eg, antigen testing)<br>Formulate a differential diagnosis of rotavirus infection |
| Management | Know the control measures for rotavirus disease especially immunization<br>Understand that antiviral agents have no definite role in the management of rotaviral disease<br>Be able to:<br>Plan the management of rotavirus disease |
| Hepatitis viruses (A, B, C) | |
| History | Know the epidemiology of hepatitis A and B (eg, mode of transmission, incubation period, period of communicability)<br>Know that perinatally-acquired hepatitis B infections are more likely to cause chronic infections than infections acquired later in life<br>Know the risk factors for acquiring hepatitis C infection (eg, blood transfusion, IV drug abuse, multiple sexual partners, homosexual activity, infant whose mother has hepatitis C)<br>Know the clinical stages of viral hepatitis infections |

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| | Know the long-term outcome of hepatitis B and C infection (eg, chronic carriers, chronic hepatitis, cirrhosis, hepatocellular carcinoma)<br>Be able to:<br>Identify symptoms suggestive of both acute and chronic infections with hepatitis viruses |
| Physical | Be able to:<br>Recognize the clinical manifestations of viral hepatitis infections in infants and older children<br>Recognize onset of complications in a known child with viral hepatitis |
| Diagnosis | Know that the best test for the diagnosis of hepatitis A is serology: HAV IgM for acute infection, HAV IgG for immunity<br>Know the appropriate diagnostic tests for hepatitis C infection (nucleic acid amplification, serology) and the appropriate timing of these tests for exposed individuals<br>Know that children with chronic hepatitis C infection should undergo periodic screening tests for hepatic complications and that treatment regiments are available<br>Be able to:<br>Plan the appropriate screening test for the diagnosis of hepatitis B infection (ie, serology)<br>Identify groups at high risk for acquiring hepatitis B infection<br>Select appropriate investigations for the diagnosis of a patient presenting with hepatitis |
| Management | Know the indication for routine hepatitis B immunization in endemic areas<br>Be able to:<br>Plan the treatment of an infant born to a woman who is a hepatitis B carrier (eg, combination of hepatitis vaccine and hepatitis B immune globulin (HBIG) at birth)<br>Prescribe Lamivudine and interferon in the prevention of congenital acquisition of hepatitis B infection appropriately |

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| | in the perinatal period<br>Prescribe intramuscular immune globulin and hepatitis A vaccine for postexposure prophylaxis against hepatitis A infection appropriately |
| Human papillomavirus | |
| History | Know the epidemiology of human papillomavirus: prevalence, risk factors, mode of transmission<br>Know that specific human papillomavirus strains are associated with cervical cancer and others with genital warts<br>Understand that some infants may have recurrent respiratory papillomatosis following perinatal acquisition<br>Understand that genital warts occurring after infancy often results from sexual abuse<br>Be able to:<br>Identify features in the history that puts a child at risk of human papilloma virus |
| Physical | Be able to:<br>Identify the clinical manifestations of human papilloma virus infection in childhood |
| Diagnosis | Understand the value of cytologic evaluation of mucosal lesions in making a diagnosis<br>Be able to:<br>Formulate the differential diagnosis of HPV (eg, Condyloma latum of syphilis, skin tags, seborrheic dermatitis, molluscum contagiosum) |
| Management | Be able to:<br>Plan the treatment based on the various options available (eg, topical podofilox, cryotherapy, laser vapourisation, surgical excision) |
| Cytomegalovirus | |
| History | Know how CMV is transmitted |

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| | Know which immunodeficiencies predispose a patient to CMV infection<br>Be able to:<br>Elicit symptoms suggestive of acquired CMV in immunocompetent and immunocompromised hosts |
| Physical | Be able to:<br>Recognize physical findings of CMV infection in acquired infection in both immunocompetent and immunocompromised hosts<br>Identify the clinical findings in congenital CMV and recognize that hearing loss may be the sole clinical manifestation |
| Diagnosis | Be able to:<br>Select appropriate diagnostic tests for CMV infection and the importance of timing in establishing a diagnosis of congenital CMV |
| Management | Be able to:<br>Prescribe appropriate treatment of acquired CMV in immunocompromised hosts |
| Epstein Barr virus | |
| History | Know how EBV is transmitted<br>Know the importance of host factors in the outcome of EBV infection<br>Know the potential complications of EBV<br>Be able to:<br>Elicit symptoms commonly seen with EBV infections in different age groups |
| Physical | Know the significance of a rash in a patient with EBV who is given amoxicillin or ampicillin<br>Be able to: |

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| | Identify the physical findings commonly found in EBV infections in different age groups |
| Diagnosis | Be able to:<br>Interpret the appropriate laboratory tests for establishing a diagnosis of EBV infection |
| Management | Be able to:<br>Give appropriate advice on supportive care for patients with EBV infection<br>Prescribe appropriately antivirals and steroids in EBV infection |
| Herpes simplex virus | |
| History | Know how HSV-1 and HSV-2 are transmitted and that both viruses can cause oral, genital, and/or neonatal infections<br>Understand the risk of maternal transmission of herpes simplex virus infection to newborn infants<br>Know that acquired HSV infection may be asymptomatic<br>Be able to:<br>Recognize symptoms of congenital and acquired HSV infections |
| Physical | Know that vesicles may not be present in neonatal HSV<br>Be able to:<br>Recognize clinical findings in congenital and acquired HSV infections |
| Diagnosis | Be able to:<br>Order the appropriate diagnostic tests for determining congenital and/or acquired HSV |
| Management | Be able to:<br>Plan the appropriate management of herpes simplex virus infection in children of various ages, taking into account appropriate timing of therapy |

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| Mumps | |
| History | Know how the mumps virus is transmitted<br>Know that a single mumps immunization may not provide complete immunity against infection<br>Know that mumps virus most commonly infects the salivary glands, but may also infect the pancreas, the central nervous system, and the testes |
| Physical | Be able to:<br>Identify the findings on physical exam in a patient with mumps |
| Diagnosis | Be able to:<br>Utilize the appropriate diagnostic test for mumps if testing is indicated |
| Management | Know that there is no specific antiviral treatment available |
| Rabies | |
| History | Know which animal bites are most commonly associated with rabies transmission |
| Management | Know what kinds of bites do not require rabies prophylaxis<br>Be able to:<br>Plan the appropriate management of an animal bite where rabies is a concern<br>Recommend appropriate action for the animal that bites a child |
| Parvovirus B19 | |
| History | Know which patients are at high risk of complications of parvovirus B19<br>Know that arthritis is a common clinical manifestation in adolescents and adults<br>Be aware of those at risk of developing anemia<br>Be able to: |

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| | Identify symptoms suggestive of parvovirus B19 |
| Physical | Be able to:<br>Recognize the rash of parvovirus B19 (slapped cheek) |
| Diagnosis | Know that the diagnosis is usually clinical but that serologic tests are available to test immunity or atypical clinical presentations |
| Management | Know the appropriate management of high-risk patients or high-risk contacts of patients |
| Roseola | |
| History | Know that HHV-6 is a common cause of fever without sources in infants and toddlers<br>Know the association of HHV-6 with febrile seizures<br>Be able to:<br>Recognize the typical clinical course of HHV-6 |
| Physical | Be able to:<br>Recognize the typical clinical course of HHV-6<br>Identify the characteristic rash |
| Diagnosis | Know that the diagnosis is usually clinical but that serologic tests are available |
| Management | Know how to counsel parents in the management of fever and discomfort |
| Rubella | |
| History | Know the epidemiology of rubella<br>Understand that postnatal rubella symptoms are non-specific<br>Know the risk of congenital infection associated with rubella infection in a pregnant woman |

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| Physical | Know that the rash of post-natal rubella is difficult to distinguish from other viral exanthems<br>Be able to:<br>Recognize the clinical findings in congenital rubella infection |
| Diagnosis | Be able to:<br>Plan the diagnostic evaluation of a child or newborn with suspected rubella |
| Management | Know the immunization schedule and side effects of MMR vaccine<br>Know that the vaccine is a live-virus vaccine |
| Yellow Fever | |
| History | Know that Yellow Fever is endemic to many regions in Africa and the Americas<br>Know the epidemiology of Yellow Fever<br>Be able to:<br>Recognize the range of symptoms (ie, asymptomatic to severe) and know that initial symptoms may be non-specific (eg, fever, headache, myalgias, nausea)<br>Identify the symptoms of severe Yellow Fever (eg, prostration, epistaxis, bleeding gums, hematemesis, epigastric pain) |
| Physical | Be able to:<br>Identify physical findings in severe Yellow Fever (eg, bradycardia despite fever, jaundice, hemorrhagic manifestations, edema) |
| Diagnosis | Know that diagnosis is made by viral isolation or acute and convalescent antibody titers<br>Be able to:<br>Identify laboratory abnormalities associated with Yellow Fever (eg, elevated bilirubin, anemia, leukopenia, |

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| | coagulopathy, albuminuria) |
| Management | Be able to:<br>Manage complications of Yellow Fever and be aware that there is no specific antiviral treatment<br>Provide Yellow Fever vaccine to residents of and travelers to endemic regions |
| Dengue | |
| History | Know the mode of transmission and geographic distribution of Dengue virus<br>Know and apply the WHO criteria for probable Dengue in a patient with fever and a history of possible exposure<br>Understand that patients with history of previous episodes of Dengue Fever are at risk for more severe episodes |
| Physical | Know and apply the WHO Dengue Warning Signs in a patient with suspected Dengue Fever<br>Know and apply the WHO Criteria for Severe Dengue Fever<br>Be able to:<br>Identify the physical findings of Dengue fever |
| Diagnosis | Be able to:<br>Order appropriate WHO-recommended diagnostic tests to identify warning signs and severe Dengue Fever<br>Perform the tourniquet test<br>Order appropriate follow up studies (ie, acute and convalescent titers) |
| Management | Know that there is no specific anti-viral treatment or vaccine available for Dengue Fever<br>Be able to:<br>Admit a patient with WHO warning signs for intravenous hydration<br>Appropriately manage a patient with severe plasma leakage, hemorrhage, and/or shock from Dengue Fever |

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| | Advise families on prevention of mosquito bites, and provide advice on reducing mosquito habitat |
| Japanese Encephalitis | |
| History | Know the epidemiology and transmission of Japanese Encephalitis<br>Know that the majority of infections are asymptomatic<br>Be able to:<br>Identify symptoms of Japanese Encephalitis in a patient with residence in or travel to an endemic area |
| Physical | Be able to:<br>Recognize signs of Japanese Encephalitis in a patient with residence in or recent travel to an endemic area |
| Diagnosis | Be able to:<br>Order specific tests for identifying the pathogen<br>Recognize laboratory and radiologic abnormalities that occur in patients with Japanese Encephalitis |
| Management | Know the appropriate use of Japanese Encephalitis vaccine in residents of and travelers to endemic regions<br>Know that there is no specific anti-viral therapy<br>Be able to:<br>Provide supportive care to a patient with Japanese Encephalitis |
| Enteroviruses | |
| History | Understand that there are multiple types of enteroviruses with a wide range of clinical manifestations<br>Know that in temperate regions enteroviruses are more common in the warmer months<br>Understand the mode of transmission of enteroviruses<br>Know that enteroviruses are the most common cause of viral meningitis |

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| Physical | Be able to:<br>Recognize clinical findings of hand, foot, and mouth disease |
| Diagnosis | Be able to:<br>Utilize diagnostic tests for enterovirus (viral culture and nucleic acid amplification) in forming the diagnosis of viral meningitis |
| Management | Be able to:<br>Plan the management of enterovirual infection and its complications |
| Influenza | |
| History | Understand the epidemiology and molecular biology of influenza and how this leads to the constant evolution of new strains<br>Understand the underlying risk factors for severe disease<br>Be able to:<br>Identify symptoms which suggest influenza or its complications |
| Physical | Be able to:<br>Recognize the signs of influenza and its complications |
| Diagnosis | Be able to:<br>Order and utilize the laboratory tests used in the diagnosis of influenza when appropriate |
| Management | Know the antiviral medications effective in the treatment of influenza<br>Know that influenza can develop resistance to antiviral medications so that treatment regimens should be reviewed periodically<br>Know which patients should receive antiviral treatment |

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| | Be able to:<br>Prescribe anti-viral medications appropriately |
| Parainfluenza virus | |
| History | Know the epidemiology of parainfluenza virus<br>Be able to:<br>Recognize common clinical symptoms |
| Physical | Be able to:<br>Recognize common findings on physical exam |
| Diagnosis | Be able to:<br>Utilize diagnostic tests available for determining parainfluenza virus infection |
| Management | Know that treatment is supportive |
| Rhinovirus | |
| History | Know that rhinovirus is a cause of the common cold but also a cause of bronchiolitis in infants and asthma exacerbations in children |
| Physical | Know that rhinovirus infections are difficult to distinguish clinically from other viral infections |
| Diagnosis | Be able to:<br>Order and utilize the diagnostic tests available for rhinovirus when appropriate (eg, distinguishing viral from bacterial infection in a patient hospitalized with asthma exacerbation) |
| Management | Be able to:<br>Manage the complications associated with rhinovirus (eg, bronchiolitis, asthma exacerbations) |
| Poliovirus | |

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| History | Know the epidemiology of polioviruses<br>Know that most infections are asymptomatic<br>Be able to:<br>Recognize the range of symptoms associated with poliovirus infection |
| Physical | Be able to:<br>Recognize the physical findings of polio with neurologic involvement |
| Diagnosis | Know the diagnostic tests for acute poliomyelitis |
| Management | Know the indications, contraindications, and schedules for the poliovirus vaccine.<br>Understand the efficacy and safety of the poliovirus vaccine<br>Be able to:<br>Provide supportive treatment |
| Arboviruses (for yellow Fever and Dengue see above) | |
| History | Know the epidemiology of arboviruses specific to the region<br>Be able to:<br>Elicit symptoms suggestive of arbovirus infections (eg, encephalitis, flu-like illnesses, hemorrhagic fevers |
| Physical | Be able to:<br>Recognize clinical symptoms of these arboviruses |
| Diagnosis | |
| Management | Know that there is no specific treatment<br>Be able to: |

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| | Provide supportive treatment for initial presentation and complications |

| **Bacterial pathogens**<br>By the end of training, the resident should: | |
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| Anaerobes (general) | |
| History | Know that infections occur commonly at sites of trauma, crush injury, perforations, and devascularized tissue<br>Know the various clinical manifestations of anaerobic infections |
| Physical | Be able to:<br>Recognize the common clinical manifestations of anaerobic infections (eg, skin and soft tissue, oral/ dental, intra-abdominal and brain) |
| Diagnosis | Be able to:<br>Obtain appropriate microbiological specimen for anaerobic culture |
| Management | Be able to:<br>Utilize the appropriate treatment of anaerobic infections (eg, specific antibiotics, drainage of collections) |
| Brucella (brucellosis) | |
| History | Know the epidemiology of brucellosis (ie, prevalence, age-incidence and route of transmission)<br>Know the risk factors for brucellosis<br>Know that it is a zoonotic disease attributable to goat, sheep, swine, and dog<br>Be able to:<br>Elicit the clinical symptoms suggestive of brucellosis |

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| Physical | Be able to:<br>Identify the different clinical manifestations of brucellosis |
| Diagnosis | Know that brucellosis should be considered in the differential diagnosis of fever of unknown origin<br>Understand the need for prolonged culture incubation (21days)<br>Be able to:<br>Select appropriate serologic methods (serum agglutination test) |
| Management | Be able to:<br>Plan the treatment with appropriate use of antibiotics<br>Manage the problems associated with of relapse<br>Recognize the Jarisch-Herxheimer- like reaction as a possible complication of treatment |
| Campylobacter species | |
| History | Know the epidemiology of Campylobacter infections (eg, in the GI tract of domestic and wild poultry, dogs, cats)<br>Know the various clinical syndromes associated with campylobacter infection (eg, Bacteremia, gastroenteritis, focal extra-intestinal diseases, especially among immunosuppressed patients)<br>Be able to:<br>Elicit the clinical symptoms suggestive of campylobacter infection |
| Physical | Be able to:<br>Recognize the clinical manifestations of a Campylobacter infection<br>Identify complications of the disease |
| Diagnosis | Know that diagnosis is made by culture of stool |

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| Management | Be able to:<br>Plan the treatment of a Campylobacter infection |
| Bartonella henselae (cat-scratch disease) | |
| History | Know the epidemiology of cat-scratch disease (ie, recent contact with cats, often kittens)<br>Know the major clinical manifestations of the disease<br>Know the possible complications (eg, encephalopathy, myelitis, cerebellar ataxia, retinopathy and haematologic abnormalities)<br>Be able to:<br>Elicit the clinical symptoms suggestive of b Bartonella henselae (eg, fever of unknown origin) |
| Physical | Be able to:<br>Recognize the clinical manifestations of cat-scratch disease (eg, chronic lymphadenopathy, Parinaud occuloglandular syndrome) |
| Diagnosis | Be able to:<br>Formulate a differential diagnosis in a patient with suspected cat-scratch disease<br>Interpret appropriate diagnostic tests (eg, serologic tests, nucleic acid amplification tests, biopsy) |
| Management | Know the indications for needle aspiration of affected lymph nodes<br>Be able to:<br>Treat appropriately |
| Chlamydia and Chlamydophila (chlamydial infections) | |
| History | Know the mode of transmission of Chlamydia trachomatis (eg, mother to infant; sexually)<br>Know that chlamydophila pneumoniae can cause illness that resembles mycoplasma pneumoniae infection both clinically |

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| | and epidemiologically<br>Be able to:<br>Elicit symptoms suggestive of chlamidydia infections |
| Physical | Be able to:<br>Recognize the clinical manifestations of Chlamydia trachomatis in a neonate (eg, neonatal conjunctivitis)<br>Recognize the clinical manifestations of Chlamydia trachomatis pneumonia in young infants<br>Recognize the clinical manifestations of genital tract infections caused by Chlamydia trachomatis (eg, vaginitis, urethritis, cervicitis, epididymitis, endometritis, and chronic pelvic inflammatory disease leading to infertility) |
| Diagnosis | Be able to:<br>Use the appropriate diagnostic tests for different sites of Chlamydia trachomatis infection (eg, conjunctival scraping for culture, nucleic acid amplification, DNA probe, direct fluorescent antibody titer) |
| Management | Be able to:<br>Plan the treatment of a chlamydial infection (eg, conjunctivitis, pneumonia, genital tract infection) |
| Clostridium botulinum (botulism) | |
| History | Know the epidemiology of botulism (food borne, wound infection, infant)<br>Be able to:<br>Elicit symptoms suggestive of botulism |
| Physical | Be able to:<br>Recognize the clinical manifestations of infant botulism and botulism in older children |
| Diagnosis | Be able to:<br>Plan the laboratory diagnosis of botulism (eg, detection of toxins, bacteriologic studies on stool, nerve conduction, |

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| | and electromyogram) |
| Management | Be able to:<br>Plan the treatment of infant botulis, antitoxins and supportive care<br>Plan the treatment of botulism in infants and older children (ie, therapy, antibiotics for wound botulism after antitoxins administered)<br>Advise parents/caregivers of the need to avoid honey ingestion in infants but know that there are also other unidentified food and environmental sources of the bacteria |
| Clostridium difficile | |
| History | Know the epidemiology of clostridium difficile<br>Be able to:<br>Elicit symptoms suggestive of clostridium difficile(eg, diarrhea, pseudomembranous enterocolitis ) |
| Physical | Be able to:<br>Recognize the clinical manifestations of Clostridium difficile infection |
| Diagnosis | Understand the significance of finding Clostridium difficile toxin in the stool at different ages (eg, neonate versus 4-year-old child)<br>Be able to:<br>Diagnose Clostridium difficile infection and have a list of possible differential diagnosis |
| Management | Be able to:<br>Plan the treatment of a clostridium difficile infection<br>Advise on proper infection control measures for clostridium difficile infection |
| Corynebacterium diphtheriae (diphtheria) | |

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| History | Know the epidemiology (eg, age incidence, route of transmission and the role of asymptomatic carriers)<br>Be able to:<br>Elicit symptoms suggestive of diptheria |
| Physical | Know the complications of diphtheria<br>Be able to:<br>Recognize the clinical manifestations and types of diphtheria |
| Diagnosis | Know that diagnosis is made by culturing nose, throat, or any mucosal or cutaneous lesion, and by using selective media<br>Be able to:<br>Formulate a workable differential diagnoses for diphtheria |
| Management | Be able to:<br>Plan the treatment of diphtheria using appropriate antibiotics and antitoxins<br>Recognize the indications for treatment among close contacts of cases<br>Prescribe vaccination as a control measure as appropriate<br>Appropriately refer to a specialist |
| Enterococcus | |
| History | Know the role of enterococcus in nosocomial infection<br>Be able to:<br>Elicit the symptoms associated with enterococcal infections (eg, urinary tract infection, bacteremia with and without endocarditis, meningitis, peritonitis) |
| Physical | Be able to: |

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| | Recognize the clinical manifestations of enterococcal infection |
| Diagnosis | Be able to:<br>Plan the laboratory diagnosis of enterococcal infections |
| Management | Know the treatment of enterococcal infections (eg, drug(s) of choice, alternative drugs, and ineffective drugs)<br>Be able to:<br>Promote environmental sanitation and personal hygiene in the control of the infection<br>Prescribe appropriate treatment |
| Escherichia coli (for hemolytic-uremic syndrome see ***Nephrology***) | |
| History | Know the epidemiology of E.coli infection<br>Know the association of enterohemorrhagic escherichia coli with hemolytic-uremic syndrome<br>Understand the association of dysenteric illness with enteroinvasive E.coli<br>Understand the association of severe secretory diarrhea with enterotoxigenic E.coli<br>Be able to:<br>Identify symptoms suggestive of E Coli infections |
| Physical | Be able to:<br>Recognize the clinical manifestations of Escherichia coli infection in children of various ages relevant to each sub-type |
| Diagnosis | Be able to:<br>Properly use stool culture and latex agglutination to make diagnosis<br>Use duodenal aspirate culture in making diagnosis of enteropathogenic E.coli infection |
| Management | Be able to: |

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| | Plan the treatment of E.coli infection using appropriate antibiotics based on local sensitivity patter<br>Plan the treatment of enterohemorrhagic E. coli (ie, fluids, no antibiotics, monitoring for complications)<br>Advise mothers living in endemic regions of the crucial role of prolonged breastfeeding in the prevention of E.coli diarrhea |
| Neisseria gonorrhoeae (gonococcal infections) | |
| History | Know the epidemiology of gonococcal infection (ie, neonatal disease is usually acquired during birth while exposure to infected care givers is frequent in the post neonatal age)<br>Know the risk factors in the post neonatal age (eg, multiple sexual partners and presence of other sexually transmitted diseases)<br>Be able to:<br>Identify symptoms suggestive of gonnococcal infetion (eg, disseminated gonococcal infection, neonatal conjunctivitis, pharyngitis, urethritis, cervicitis, salpingitis, pelvic inflammatory disease) |
| Physical | Be able to:<br>Identify the major clinical manifestations of Neisseria gonorrhoeae infection |
| Diagnosis | Know the importance of investigation other sexually transmitted infections in a patient with gonorrhea<br>Be able to:<br>Utilize the proper laboratory tests for diagnosing Neisseria gonorrhoeae (ie, isolation, nucleic acid amplification)<br>Formulate the differential diagnosis of neonatal conjunctivitis |
| Management | Be able to:<br>Develop an effective treatment plan for the major clinical diseases caused by Neisseria gonorrhoeae infection<br>Advise and implement infection control measures for gonococcal infections (eg, prevention of neonatal ophthalmia, |

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| | infants born to mothers with gonococcal infection, management of sexual partners)<br>Recognize and manage its complications |
| Hemophilus influenzae | |
| History | Understand the epidemiology of Haemophilus influenza type b infection (ie, invasive disease occurs most often among young infants and the immunocompromised) and that incidence is low in immunized populations<br>Know that non-typable H. influenza commonly colonizes the respiratory tract and may cause sinus and ear infections, conjunctivitis, and occasionally, more severe infections (eg, bacteremia, meningitis)<br>Be able to:<br>Obtain an accurate immunization history<br>Identify clinical symptoms suggestive of hemophilus influenza infection |
| Physical | Be able to:<br>Identify the clinical manifestations of Hemophilus influenzae type b infection |
| Diagnosis | Be able to:<br>Differentiate between colonization and invasive diseases<br>Plan the laboratory assessments necessary for diagnosis (ie, isolation, culture using sheep blood agar, serotyping with slide – agglutination, latex particle agglutination)<br>Recognize the differential diagnosis of H. influenza infection |
| Management | Be able to:<br>Properly prescribe prophylactic antibiotics for contacts of patients with invasive H. influenza disease<br>Plan the treatment of a non-typable Hemophilus influenzae infection<br>Appropriately use vaccination in the control of the infection |

| Helicobacter pylori | |
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| History | Know the epidemiology (eg, age, low socioeconomic status, residence in developing countries, carrier states)<br>Know that the exact route of transmission is unknown, but that the faeco-oral route is suggested<br>Understand the Helicobacter pylori infection may be asymptomatic in children<br>Know that chronic active gastritis, as a result of the infection, increases the risk of duodenal and gastric ulcers<br>Understand that chronic abdominal pain and dyspepsia are rarely associated with H.pylori infection in children<br>Know that infection with H.pylori infection leads to silent gastritis |
| Physical | Be able to:<br>Identify the common clinical manifestation of Helicobacter infection |
| Diagnosis | Be able to:<br>Plan the appropriate laboratory evaluation of a patient suspected of infection with H.pylori (eg, urea breath test, stool antigen test, culture of gastric mucosal biopsy)<br>Develop a differential diagnosis of H.pylori infection |
| Management | Be able to:<br>Plan the treatment of a helicobacter pylori infection |
| Kingella kingae | |
| History | Know that it is an emerging pathogen<br>Know that it is a normal inhabitant of the respiratory tract and could become invasive when there is concomitant viral infection<br>Be aware of local epidemiology<br>Be able to: |

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| | Elicit the symptoms of the most common infections associated with Kingella kingae (eg, pyogenic arthritis, osteomyelitis, endocarditis) |
| Physical | Be able to:<br>Recognize the different presentations of K. Kingae infection |
| Diagnosis | Be able to:<br>Order appropriate diagnostic tests to isolate the organism |
| Management | Be able to:<br>Plan appropriate treatment for K. kingae bone and joint infections and endocarditis |
| Listeria monocytogenes | |
| History | Know its mode of transmission<br>Know that most infections occur in the perinatal period secondary to maternal colonization<br>Know that Listeria monocytogenes as a cause of neonatal sepsis and Listeriosis in the immunocompromised |
| Physical | Be able to:<br>Recognize the major clinical manifestations |
| Diagnosis | Be able to:<br>Plan the laboratory diagnosis of listeriosis from blood and CSF<br>Use appropriate histologic examination of placenta in making diagnosis |
| Management | Be able to:<br>Plan the treatment for listeriosis<br>Identify complications and plan the continued management |

| Borrelia burgdorferi (Lyme disease) | |
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| History | Know that Lyme disease is a zoonotic infection transmitted through the bite of infected ticks<br>Know that may be confused with juvenile idiopathic (rheumatoid) arthritis<br>Be able to:<br>Elicit symptoms suggestive of Lyme disease (eg, fever, arthritis) |
| Physical | Be able to:<br>Recognize the clinical manifestations of Lyme disease<br>Classify features into early or late, localized or disseminated |
| Diagnosis | Know when diagnostic testing is and is not appropriate<br>Know the appropriate tests for screening (EIA or IFA) and what to do when results are positive or equivocal results<br>Know that there is a high rate of false positive results for Lyme disease with the screening test for serum antibodies (EIA or IFA)<br>Be able to:<br>Diagnose Lyme disease clinically (erythema migrans) |
| Management | Be able to:<br>Prescribe proper treatment of Borrelia burgdorferi (ie, drug(s) of choice, alternative drugs, and ineffective drugs) |
| Neisseria meningitidis (meningococcal infections) | |
| History | Know the major clinical syndromes of Neisseria meningitidis (ie, meningococcemia, meningitis)<br>Know the epidemiology of Neisseria meningitides infection<br>Be able to:<br>Identify which patients are at increased risk of invasive and recurrent meningococcal disease (eg, asplenia, terminal |

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| | complement component)<br>Identify clinical symptoms of meningococcal infections |
| Physical | Be able to:<br>Recognize the major clinical manifestations of meningococcemia and meningitis |
| Diagnosis | Be able to:<br>Use proper diagnostic tests for invasive meningococcal disease (ie, Gram stain, isolation, antigen detection, polymerase chain reaction) |
| Management | Be able to:<br>Plan the treatment of a Neisseria meningitidis infection<br>Utilize appropriate chemoprophylaxis -for close contacts of patients with invasive N. meningitidis disease<br>Advise parents appropriately when it is reported that a child has been exposed to meningitis in school<br>Appropriately use meningococcal polyvalent vaccine |
| Mycobacterium tuberculosis | |
| History | Know the clinical types of tuberculosis (eg, primary, progressive pulmonary, disseminated, miliary, and extra-pulmonary)<br>Know the populations and age groups at high risk for all clinical types of tuberculosis and latent tuberculosis infection<br>Understand the epidemiology of tuberculosis worldwide including high burden countries and in your own locality<br>Understand the relationship between tuberculosis and HIV/AIDS<br>Understand the pathogenesis of all forms of tuberculosis including factors affecting mode of transmission and reasons for latent infection and reactivation<br>Be able to: |

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| | Identify symptoms suggestive of Mycobacterium tuberculosis (pneumonia, lymphadenitis, arthritis, meningitis, and osteomyelitis)<br>Identify features in the history that are risk factors for development of tuberculosis |
| Physical | Be able to:<br>Recognize the major clinical manifestations of infection with Mycobacterium tuberculosis |
| Diagnosis | Know the WHO recommendations for use of various tests in the diagnosis of latent TB infection (LTBI) and active tuberculosis and understand their predictive values<br>Understand the relationship between the properties of mycobacteria and the staining techniques used to identify them<br>Know that the isolation of mycobacteria from infected cases is difficult due to pauci-bacillary type of disease in children<br>Understand the reasons for false-positive and false-negative tuberculin skin test results<br>Be able to:<br>Identify and interpret a positive tuberculin skin test<br>Utilize and interpret an x-ray study of the chest when a tuberculin skin test is positive or in the presence of suggestive clinical features even when tuberculin skin test is negative<br>Differentiate between a latent tuberculosis infection and tuberculosis disease<br>Utilize and interpret newer laboratory diagnostic methods for tuberculosis (eg, BACTEC, PCR, IGRA) |
| Management | Be aware of international guidelines on the management of tuberculosis (eg CDC and WHO)<br>Know the WHO definitions of cases and of treatment outcomes<br>Know that WHO category 3 has been removed in countries with high INH resistance and TB-HIV co-infection<br>Be aware of the components of the WHO Directly Observed Therapy Short course (DOTS) strategy |

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| | Understand the implications of multi-drug resistant TB (MDR-TB) and extensively resistant TB (XDR-TB) and its treatment<br>Be able to:<br>Apply WHO guidelines on the pharmacological treatment of tuberculosis including use of multiple medications, regimen dependent on type of disease and resistance pattern of organism, and prolonged treatment in conditions such as bone and CNS disease<br>Plan the management of a newborn infant with perinatal exposure to tuberculosis<br>Plan the management of a child who has an adult household contact with active tuberculosis<br>Isolate a hospitalized patient with tuberculosis when appropriate (eg, disease state, duration)<br>Plan the treatment of HIV/TB co-infection<br>Identify common barriers to adherence in pediatric populations and plan age-appropriate strategies to improve adherence<br>Discuss with families and healthcare workers methods of TB prevention including contact investigation, BCG infection and management of those with latent infection |
| Nontuberculous mycobacteria (NTM) | |
| History | Know the epidemiology on NTM infections (may be zoonotic)<br>Understand the relationship between NTM infections and HIV/AIDS<br>Understand that pulmonary infection caused by NTM is uncommon in children |
| Physical | Be able to:<br>Recognize the major clinical manifestations of nontuberculous mycobacteria in immunocompetent children |
| Diagnosis | Know that tuberculin skin test is usually weakly positive<br>Be able to: |

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| | Consider that cervical adenitis may be secondary to nontuberculous mycobacteria<br>Develop the differential diagnosis of NTM lymphadenitis including, TB, cat-scratch disease, infectious mononucleosis, and malignancies |
| Management | Understand the role and limitations of complete surgical excision in the treatment of NTM adenitis<br>Be able to:<br>Plan the treatment of cervical adenitis secondary to nontuberculous mycobacteria |
| Mycoplasma pneumoniae | |
| History | Know that Mycoplasma pneumoniae is a leading cause of pneumonia in school-age children and young adults<br>Know the epidemiology of Mycoplasma pneumonia (eg, long incubation period; community epidemics; outbreaks in hospitals, colleges, military bases)<br>Be able to:<br>Elicit the respiratory symptoms suggestive of Mycoplasma infection and of the extrapulmonary manifestations (eg, pharyngitis, rash, Stevens-Johnson syndrome, hemolytic anemia, arthritis, CNS disease) |
| Physical | Be able to:<br>Recognize the age-related clinical manifestations of Mycoplasma infections |
| Diagnosis | Be able to:<br>Use proper laboratory tests for diagnosing Mycoplasma pneumonia (eg, serology, polymerase chain reaction)<br>Recognize that culture may not be positive earlier than 1 week |
| Management | Be able to:<br>Plan the treatment of Mycoplasma pneumoniae infection |
| Pasteurella multocida | |

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| History | Know the mode of transmission |
| Physical | Be able to:<br>Recognize the most common clinical manifestation of a P. multocida infection (ie, cellulitis at the site of an animal bite that develops within 24 hours of injury) |
| Diagnosis | Be able to:<br>Plan the laboratory diagnosis of P.multicoda |
| Management | Be able to:<br>Plan the treatment of P. multocida infection |
| Bordetella pertussis | |
| History | Know that adolescents and adults are important sources of exposure to pertussis in infants and children<br>Know the mode of transmission for pertussis<br>Recognize the complications of pertussis<br>Know the clinical course and manifestation of pertussis<br>Know that immunity to pertussis is not life-long<br>Be able to:<br>Elicit symptoms suggestive of bordetella |
| Physical | Be able to:<br>Recognize the clinical manifestations of pertussis in neonates, children, and adolescents |
| Diagnosis | Be able to:<br>Utilize the diagnostic tests available for pertussis (eg, polymerase chain reaction, serology, direct fluorescent |

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| | antibody) |
| Management | Understand the importance of pertussis immunization for family members of newborn infants<br>Be able to:<br>Plan the management of a patient with pertussis<br>Recognize that antibiotic treatment does not alter the clinical course of pertussis in the paroxysmal phase<br>Plan the use of chemoprophylaxis for the contacts of patients who have pertussis |
| Pseudomonas species | |
| History | Know the risk factors for development of severe pseudomonas infections (eg, cystic fibrosis, cancer patients with neutropenia, hospitalized patients receiving broad-spectrum antibiotic therapy)<br>Know that pseudomonas commonly causes nosocomial infection particularly in burns injury and surgical wounds<br>Be able to:<br>Elicit the symptoms suggestive of the various presentations of pseudomonas infections (eg, endocarditis, pneumonia, ecthyma gangrenosum, chronic otitis media, mastoiditis) |
| Physical | Be able to:<br>Recognize classical manifestation of pseudomonas infection |
| Diagnosis | Be able to:<br>Recognize the characteristic color of the clinical specimen<br>Plan/order laboratory diagnosis of pseudomonas infection |
| Management | Know the importance of isolation, debridement, and topical treatment of wounds and burns<br>Be able to: |

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| | Plan the treatment of the infection bearing in mind the burden of resistant strains |
| Salmonella species | |
| History | Know the epidemiology of typhoidal and non-typhoidal species(ie, age incidence and risk factors)<br>Know the factors predisposing to bacteremia during salmonella gastroenteritis<br>Be able to<br>Elicit symptoms suggestive of typhoid and salmonella gastroentertis |
| Physical | Be able to:<br>Recognize the clinical manifestation of typhoid fever<br>Recognize the clinical manifestations of non-typhoidal Salmonella gastroenteritis (eg, fever, increased leukocyte count, diarrhea, blood, mucus, neutrophils in stool, bacteremia, osteomyelitis, meningitis and brain abscess)<br>Identify patients at high risk of invasive Salmonella infection (eg, young infants, patients with immunodeficiency or hemoglobinopathy) |
| Diagnosis | Know the diagnostic relevance of stool, urine, blood and other specimen cultures, and serology |
| Management | Know that antimicrobial therapy is not indicated in otherwise healthy patients with uncomplicated Salmonella gastroenteritis<br>Be able to:<br>Plan the treatment of an invasive Salmonella infection<br>Organize and implement standard control measures for salmonella infection |
| Shigella species (shigellosis) | |
| History | Know the epidemiology (ie, age incidence and route of transmission)<br>Know the major clinical manifestations of shigellosis (ie, gastrointestinal and extra-intestinal disease) |

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| | Know the complications of shigellosis<br>Be able to:<br>Elicit symptoms suggestive of typhoid and shigella gastroentertis |
| Physical | Be able to:<br>Recognize the major clinical manifestations of Shigella species (eg, fever, seizures, diarrhea, blood, mucous, and neutrophils in stool) |
| Diagnosis | Know that stool culture is done with selective media which excludes campylobacter spp<br>Be able to:<br>Identify the presence of leucocytes in stool as a feature of shigella infection |
| Management | Be able to:<br>Plan the treatment of Shigella infection |
| Staphylococcus aureus (see also ***Dermatology***) | |
| History | Know that methicillin-resistant Staphylococcus aureus (MRSA) is a common cause of skin and soft tissue infections<br>Know risk factors for invasive infection (eg, surgery, wounds, malnutrition, chronic diseases such as diabetes and cirrhosis)<br>Be able to:<br>Recognize symptoms suggestive of staphylococcal toxic shock syndrome |
| Physical | Be able to:<br>Recognize the major clinical syndromes of Staphylococcus aureus (eg, cellulitis, osteomyelitis, pyogenic arthritis, furunculosis, scalded skin syndrome, toxic shock syndrome, pneumonia, and endocarditis) |
| Diagnosis | Be able to: |

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| | Initiate isolation and susceptibility testing when Staphylococcus aureus infection is suspected<br>Plan appropriate microbiological investigation to isolate the organism |
| Management | Be able to:<br>Treat methicillin-sensitive and methicillin resistant Staphylococcus aureus infection appropriately<br>Perform incision and drainage for Staphylococcus aureus furunculosis<br>Plan the management of a patient with staphylococcal toxic shock syndrome (ie, aggressive drainage of accessible site(s) of infection, therapy with both a bacterial cell wall inhibitor [eg, oxacillin, vancomycin] and a protein synthesis inhibitor [eg, clindamycin]) |
| Staphylococcus, coagulase-negative | |
| History | Understand that coagulase-negative staphylococcal infections are usually associated with intravascular or urinary catheters, CSF shunts and other foreign bodies<br>Know that many coagulase-negative staphylococcal isolates represent contamination of the culture material<br>Be able to:<br>Elicit symptoms suggestive of coagulase negative infections |
| Physical | Be able to:<br>Recognize the different clinical manifestations of Coagulase Negative Staphylococcus infection |
| Diagnosis | Be able to:<br>Utilize appropriate laboratory methods for confirmation of diagnosis |
| Management | Be able to:<br>Plan appropriate treatment based on antibiotic sensitivity pattern of the locality |
| Streptococcus agalactiae (group B streptococcus) | |

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| History | Know the epidemiology of streptococcus agalactiae infection<br>Be able to:<br>Elicit symptoms suggestive of group B streptococcal infection (eg, early onset septicemia and pneumonia; late onset bacteremia, pneumonia, meningitis, pyogenic arthritis, and osteomyelitis) |
| Physical | Be able to:<br>Recognize the major clinical manifestations of group B streptococcal infection |
| Diagnosis | Know the recommendations for evaluation of an infant whose mother is colonized with group B streptococcus, and how the administration of intrapartum antibiotic therapy affects the evaluation<br>Understand recommendations for maternal screening and intrapartum prophylaxis for group B streptococcus |
| Management | Be able to:<br>Treat group B streptococcus infection |
| Streptococcus pneumonia (pneumococcal infections) | |
| History | Know the populations in which invasive pneumococcal disease is more common (eg, children with sickle cell disease, asplenia, HIV/AIDS, cochlear implants)<br>Be able to:<br>Identify the symptoms of pneumoccocal infections (eg, otitis, sinusitis, bacteremia, pneumonia, and meningitis) |
| Physical | Be able to:<br>Recognize the major clinical manifestations of Streptococcus pneumonia infection |
| Diagnosis | Be able to:<br>Plan/order appropriate investigations to isolate the organism |
| Management | Know that the treatment of Streptococcus pneumonia infection depends on |

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| | Be able to:<br>Prescribe appropriate treatment dependant on antibiotic susceptibility testing and that the type of infection<br>Plan appropriate prophylaxis against pneumococcal infections using conjugate and polysaccharide pneumococcal vaccines |
| Streptococcus pyogenes (group A streptococcus) | |
| History | Know the mode of transmission of group A streptococcus<br>Know the association between invasive group A streptococcal infection and varicella<br>Be able to:<br>Elicit symptoms suggestive of group A streptococcus infection (eg, pharyngitis, impetigo, cellulitis, toxic shock syndrome, necrotizing fasciitis)<br>Elicit symptoms suggestive of complications of infection(eg, rheumatic fever, glomerulonephritis, retro-, para-pharyngeal abscess) |
| Physical | Be able to:<br>Recognize the clinical manifestations of group A streptococcal infection<br>Recognize the complications of poststreptococcal infection |
| Diagnosis | Be able to:<br>Order the laboratory tests for group A streptococcal infection (eg, isolation, antigen detection; ASO, anti-DNAse B titres) |
| Management | Be able to:<br>Treat group A streptococcal infection and its complications |
| Clostridium tetani (tetanus) | |

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| History | Know that trismus is a common symptom of tetanus<br>Be able to:<br>Identify risk factors for development of tetanus<br>Recognize symptoms of tetanus in an unimmunized or incompletely immunized patient |
| Physical | Be able to:<br>Recognize clinical finding in generalized tetanus |
| Diagnosis | Know that the diagnosis is usually clinical |
| Management | Know the indications, schedule, and side effects of tetanus immunizations.<br>Be able to:<br>Collaboratively manage a patient with tetanus, recognizing the roles of Tetanus Immune Globulin or other immunoglobulin preparations, wound debridement, supportive care to control muscle spasms, and antibiotic therapy<br>Plan the use of Tetanus vaccine and Tetanus Immunoglobulin in the management of a wound at risk for C. tetani infection |
| Corynebacterium diphtheria | |
| History | Know the epidemiology of diphtheria<br>Be able to:<br>Recognize the symptoms of diphtheria |
| Physical | Be able to:<br>Recognize the pharyngeal findings with diphtheria |
| Diagnosis | Be able to: |

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| | Plan the diagnostic evaluation of a patient with suspected diphtheria |
| Management | Know the immunization schedule for diphtheria<br>Be able to:<br>Plan the use of anti-toxin and antibiotics in the management of diphtheria |
| Vibrio Cholera | |
| History | Be able to:<br>Recognize the clinical symptoms of cholera<br>Assess the risk of exposure to V. cholera |
| Physical | Be able to:<br>Recognize signs of severe dehydration |
| Diagnosis | Be able to:<br>Calculate the degree of dehydration<br>Plan the laboratory evaluation of a patient with cholera to determine potential metabolic complications (eg, hypoglycemia, hypoglycemia)<br>Know the appropriate laboratory tests to form a diagnose |
| Management | Be able to:<br>Administer appropriate rehydration and maintenance of hydration Prescribe the appropriate antibiotic treatment of cholera |
| Treponema pallidum (syphilis) | |
| History | Know the epidemiology of treponema pallidum infection especially the age group that is highly at risk |
| Physical | Be able to: |

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| | Recognize the clinical manifestations of congenital and acquired syphilis |
| Diagnosis | Be able to:<br>Plan the laboratory diagnosis of congenital and acquired syphilis<br>Anticipate and screen for other sexually transmitted infections in the acquired variety |
| Management | Be able to:<br>Initiate the treatment of syphilis (ie, penicillin)<br>Consider central nervous system involvement when planning the treatment regimen<br>Initiate treatment for specific complications and need refer when appropriate |
| Yersinia enterocolitica | |
| History | Know the epidemiology of infection with Yersinia enterocolitica<br>Be able to:<br>Elicit symptoms suggestive of Yersinia infection (eg, diarrhea syndromes in infants) |
| Physical | Be able to:<br>Recognize the clinical manifestations of Yersinia enterocolitica infection |
| Diagnosis | Be able to:<br>Plan appropriate investigative measures to isolate the organism |
| Management | Be able to:<br>Provide treatment of Yersinia enterocolitica infection with drugs(s) of choice and/or alternative drugs |

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| **Fungal pathogens**<br>By the end of training, the resident should: |

| Candida species | |
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| History | Know the various conditions that predispose to persistent or recurrent candidiasis of the oral cavity in children older than 6 months of age (eg, immune deficiency, AIDS, antibiotic use, burns, indwelling catheters, and total parenteral nutrition)<br>Know the various conditions that predispose to persistent or recurrent candidiasis of the oral cavity in an infant younger than 6 months of age (eg, maternal breast colonization, contaminated vitamin dropper, antibiotic use, pacifier use)<br>Know the conditions that predispose a patient to invasive candidiasis (eg, immunodeficiency, indwelling catheters, prematurity, prolonged use of broad-spectrum antibiotics)<br>Be able to:<br>Elicit symptoms suggestive of candida infections<br>Elicit predisposing factors |
| Physical | Be able to:<br>Recognize the characteristic features of candidiasis at various infection sites |
| Diagnosis | Be able to:<br>Conduct appropriate investigations to confirm diagnosis (eg, KOH, culture, Gram stain)<br>Identify candida readily in routine blood culture medium<br>Develop a differential diagnosis (eg, milk curds in the mouth) |
| Management | Be able to:<br>Plan treatment for a patient with a candida infection |
| Coccidioides | |
| History | Know the epidemiology of coccidiodes, including risk factors for disease |
| Physical | Be able to: |

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| | Recognize the clinical manifestation of the infection with this organism |
| Diagnosis | Be able to:<br>Plan the appropriate investigation to confirm diagnosis (eg, serology, histopathology, culture, radiography) |
| Management | Be able to:<br>Plan appropriate antifungal treatment in children with risk of dissemination or with severe infection |
| Aspergillus, Histoplasma, Sporothrix, Cryptococcus | |
| History | Know that aspergillosis is a fungal infection usually of the lungs and occurs almost exclusively in patients with impaired host responses<br>Know the epidemiology of these organisms<br>Know that the majority of those infected are asymptomatic or minimally symptomatic but that hosts are more likely to by symptomatic if exposed to a large inoculum<br>Know that individuals with defects in cell-mediated immunity and infants are more likely to develop symptoms<br>Be able to:<br>Recognize the symptoms of acute pulmonary histoplasmosis |
| Physical | Be able to:<br>Identify the various clinical manifestations of infection with these organisms and features of specific complications |
| Diagnosis | Be able to:<br>Recognize specific radiological features of infection with these organisms and the various methods of identification<br>Plan the diagnostic evaluation of a patient with suspected histoplasmosis |
| Management | Be able to: |

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| | Plan appropriate treatment of the infection with these organisms |
| Pneumocystis jiroveci (carinii) | |
| History | Know that pneumonia caused by Pneumocystis jiroveci (carinii) occurs almost exclusively in immunocompromised patients |
| Physical | Be able to:<br>Recognize the clinical manifestations of Pneumocystis jiroveci (carinii) infection |
| Diagnosis | Be able to:<br>Plan specific investigative procedures to confirm the diagnosis (eg, chest x-ray, serology, and lung biopsy) |
| Management | Know that trimethoprim with sulfamethoxazole is effective for the prophylaxis of a Pneumocystis jiroveci (carinii) infection<br>Be able to:<br>Plan effective treatment for P. jiroveci infection |

| **Parasitic pathogens**<br>By the end of training, the resident should: | |
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| Giardia lamblia (giardiasis) | |
| History | Know the epidemiology of Giardia lamblia infection (giardiasis), including mode of transmission, common reservoirs and risk factors<br>Be able to:<br>Elicit symptoms of giardia infection (eg, acute diarrhea and malabsorption) |
| Physical | Be able to:<br>Recognize the various clinical manifestations of giardiasis |
| Diagnosis | Be able to: |

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| | Plan appropriate laboratory tests for Giardia lamblia infection (giardiasis), including stool examination, duodenal aspirate or biopsy, and stool Enzyme Immunoassay |
| Management | Be aware not to provide treatment to asymptomatic carriers<br>Be able to:<br>Implement the treatment of symptomatic Giardia lamblia (giardiasis) infection with drug(s) of choice and/or alternative drugs |
| Toxoplasma gondii (toxoplasmosis) | |
| History | Know the epidemiology of toxoplasmosis (ie, hosts, intermediate hosts, and modes of transmission (vertical transmission from mother to infant, ingestion of cysts from contaminated food or soil)<br>Be able to:<br>Elicit symptoms suggestive of toxoplasmosis |
| Physical | Know the clinical manifestations of congenital toxoplasmosis and the importance of prompt treatment<br>Be able to:<br>Identify the clinical manifestations of Toxoplasma gondii infections acquired after birth |
| Diagnosis | Be able to:<br>Formulate the differential diagnosis of the infection<br>Plan appropriate investigation to confirm diagnosis (eg, serology and histology) |
| Management | Be able to:<br>Consult with specialist in management of infected patients |
| Trichomonas vaginalis (trichomoniasis) | |
| History | Know the epidemiology of Trichomonas vaginalis |

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| | Consider the possibility of sexual abuse in children with trichomoniasis<br>Be able to:<br>Elicit symptoms suggestive of trichomoniasis (eg, vaginitis, vaginal discharge) |
| Physical | Be able to:<br>Recognize the clinical manifestations of Trichomonas vaginalis infection |
| Diagnosis | Be able to:<br>Use the tests needed for diagnosis of Trichomas vaginalis infection (eg, examination of a wet-mount preparation of vaginal secretions, antigen and nucleic acid detection) |
| Management | Be able to:<br>Initiate treatment of Trichomonas vaginalis and recommend that the partner also be treated |
| Enterobius vermicularis (pinworms) | |
| History | Know the epidemiology of its infestation<br>Understand the life cycle of the helminth<br>Know the possibility of auto-infection in children<br>Be able to:<br>Elicit symptoms suggestive of pinworm infectation (eg, priritis) |
| Physical | Be able to:<br>Recognize the various clinical manifestation of pin worm infection in children (eg, pruritus ani, rectal prolapsed) |
| Diagnosis | Be familiar with the diagnostic tests needed to make a diagnosis of Enterobius vermicularis |
| Management | Be able to: |

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| | Treat infections caused by Enterobius vermicularis |
| Malaria | |
| History | Know the local and international epidemiology of malaria including the prevalence for different plasmodium species in your own locality<br>Understand the immunology of malaria including the major defense mechanisms and why re-infection occurs<br>Understand the pathogenesis of malaria including vectors and modes of transmission, and mechanisms of relapse and recurrence<br>Know the main malaria species that infect humans and the distinctive characteristics of each<br>Know that malaria parasites have developed resistance to many drugs<br>Understand that severity of malaria symptoms are affected by infecting species and patient factors (e.g. age, immunity)<br>Understand factors that may influence genetic resistance (e.g. sickle cell disease and G6PD deficiency)<br>Understand the effects of malaria in pregnancy upon neonatal outcomes<br>Be able to:<br>Elicit a history that illuminates the risk of exposure to different malaria parasites<br>Elicit a previous history of malaria infection in determining the likelihood of relapse<br>Elicit a history of factors that may influence severity of disease |
| Physical | Be able to:<br>Recognize the clinical manifestations of uncomplicated malaria in children<br>Identify the characteristic features of severe malaria in children (e.g., cerebral malaria, severe anemia, hyperpyrexia, hyperparasitemia)<br>Recognize clinical signs of malaria that require urgent intervention |

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| Diagnosis | Know the role of the use of thick and thin smears<br>Know the antigens used in rapid diagnostic kits and sensitivity and specificity of detection of different plasmodia<br>Be able to:<br>Consider malaria as a possible diagnosis in a febrile patient who lives in or has recently traveled to an endemic region<br>Recognize congenital/neonatal malaria as a differential of neonatal sepsis in malaria endemic regions<br>Promptly diagnose Plasmodium falciparum infection<br>Interpret findings on the complete blood count in a patient with malaria<br>Know the WHO criteria of severe malaria infection |
| Management | Know that prophylactic regimens are determined by the country specific resistance patterns<br>Know about the major international guidelines for the treatment of malaria e.g. World Health Organization (WHO), Centers for Disease and Control (CDC)<br>Know the uses, advantages and disadvantages of current anti malarial drugs<br>Understand the causes of mortality of malaria<br>Understand the main features (including advantages and limitations) of strategies to control P. falciparum disease through vector control, through case finding and treatment, and through immunization<br>Be able to:<br>Manage uncomplicated and severe malaria using an Integrated Management of Childhood Illness (IMCI) approach providing emergency, therapeutic and supportive care<br>Monitor response to care and modify management as necessary<br>Plan initial treatment of complications |

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| | Make necessary referrals as indicated<br>Demonstrate counselling and health promotion skills on the prevention and home management of malaria |
| Strongyloides | |
| History | Know the epidemiology of Strongyloides infections<br>Know that immunocompromised hosts are at risk of disseminated infection<br>Be able to:<br>Elicit a history to assess a child's risk of exposure<br>Recognize symptoms associated with each of the life stages of Strongyloides |
| Physical | Be able to:<br>Recognize cutaneous findings sometimes associated with infection |
| Diagnosis | Know that Strongyloides can be a cause of unexplained eosinophilia<br>Be able to:<br>Order appropriate diagnostic tests for suspected Strongyloides infection considering the patient's immune status |
| Management | Be able to:<br>Order appropriate treatment for Strongyloides infection |
| Schistosomiasis | |
| History | Know the epidemiology of Schistosoma mansonai, Schistosoma japonicum, and S. haematobium infections<br>Know how the symptoms reflect the life cycle (eg, pruritic rash with cercarial penetration, Katayama fever with egg production, and urinary, intestinal, or hepatosplenic symptoms with chronic infection)<br>Be able to: |

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| | Elicit symptoms suggestive of schistosomiasis |
| Physical | Recognize the physical findings in acute schistosomiasis and chronic infection |
| Diagnosis | Be able to:<br>Plan the diagnostic evaluation of a patient with suspected schistosomiasis |
| Management | Know the appropriate medications for treatment of schistosomiasis |
| Lymphatic filariasis: Wuchereria bandrofti, Brugia species | |
| History | Know the epidemiology of infection with filarial<br>Know the symptoms of infection and know that the majority of infections are asymptomatic<br>Be able to:<br>Elicit a history assessing risk of infection if infection with the filarial |
| Physical | Know the physical findings associated with filariasis |
| Diagnosis | Be able to:<br>Plan the diagnostic evaluation of a patient with suspected filariasis |
| Management | Be able to:<br>Plan the treatment of a patient with lymphatic filariasis |
| Ascaris (ascariasis) | |
| History | Know the life cycle and epidemiology of Ascaris lumbricoides<br>Be able to:<br>Elicit symptoms suggestive of ascarias |
| Physical | Be able to: |

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| | Recognize the clinical manifestations and complications of ascariasis |
| Diagnosis | Be able to:<br>Institute appropriate investigation to identify the parasite (eg, stool microscopy) |
| Management | Be able to:<br>Plan effective treatment for ascariasis and its complications in children |
| Entamoeba histolytica and dispar (amebiasis) | |
| History | Know the epidemiology and life cycle of E. histolytica<br>Know that the majority of E. histolytica, and all E. dispar infections, are asymptomatic<br>Know that symptoms of amebic liver abscess in children may be non-specific (eg, fever, abdominal distension, tachypnea, irritability) and that pain is more likely to be located in the hepatic region in older children and adults<br>Be able to:<br>Elicit symptoms suggestive of invasive amebic dysentry (eg, abdominal pain accompanied by bloody and mucousy diarrhea) |
| Physical | Be able to:<br>Identify physical findings that may indicate infection with E. histolytica (eg, tender, distended abdomen or hepatomegaly) |
| Diagnosis | Know that to look for E histolytica in stools freshly passed stools must be examined<br>Know that Entamoeba histolytica and Entamoeba dispar are morphologically identical, but that only E. histolytica causes disease<br>Be able to:<br>Order appropriate diagnostic tests for suspected amebic liver abscess |

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| | Order appropriate diagnostic tests for amebic colitis<br>Interpret findings of E. histolytica/dispar cysts in a stool sample in the context of patient signs and symptoms |
| Management | Be able to:<br>Plan the treatment of E. histolytica liver abscess and E. histolytica colitis Institute appropriate measures to control infections |
| Necator americanus (hookworm) | |
| History | Know the geographic distribution of hookworm infestation (eg, prevalent worldwide in tropical and subtropical areas), and that it is a common cause of hypochromic microcytic anemia<br>Understand the life-cycle of the parasite<br>Be able to:<br>Elicit symptoms suggestive of hookworm infection |
| Physical | Be able to:<br>Recognize the clinical manifestations of its infestation |
| Diagnosis | Be able to:<br>Institute appropriate investigations to confirm diagnosis (eg, stool microscopy)<br>Plan other investigative procedures as determined by complications present |
| Management | Be able to:<br>Institute effective treatment for hookworm infection |
| Taenia solium, Taenia saginata, Taenia asiatica | |
| History | Understand the life-cycle of the Taenia species<br>Know that cysticercosis is a major cause of seizures in countries where Taenia solium is endemic |

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| | Be able to:<br>Elicit symptoms suggestive of Taenia infections |
| Physical | Be able to:<br>Recognize the various clinical manifestations Taenia infections |
| Diagnosis | Be able to:<br>Institute appropriate investigations to confirm diagnosis (eg, stool microscopy) |
| Management | Be able to:<br>Plan effective treatment for Taeniasis using currently available standard drugs |
| Toxocara | |
| History | Understand the epidemiology and pathogenesis of toxocariasis<br>Be able to:<br>Elicit symptoms associated with the various clinical syndromes of the infection(eg, cutaneous larva migrans, visceral larva migrans and covert toxocariasis) |
| Physical | Be able to:<br>Recognize the clinical manifestation of the infection |
| Diagnosis | Be able to:<br>Institute specific investigative tools to confirm diagnosis<br>Make a presumptive diagnosis in a young child with high eosinophilia and suggestive symptoms |
| Management | Be able to:<br>Plan appropriate treatment for toxocara infection |

| Blastocystis hominis | |
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| History | Know that B. hominis is a common intestinal protozoal parasite but that its role in human disease is controversial<br>Know that B. hominis has been associated with a range of intestinal symptoms from asymptomatic carriage to diarrhea, abdominal bloating and pain, and anal pruritis |
| Physical | Know that there are no specific physical findings with B. hominis infection |
| Diagnosis | Be able to:<br>Interpret findings of Blastocystis hominis in a stool specimen in context of the patient's signs and symptoms |
| Management | Be familiar with treatments available for B. hominis and understand that they are often ineffective |
| Leishmania | |
| History | Know the epidemiology of leishmaniasis<br>Be able to:<br>Elicit a history that illuminates the risk of exposure to Leishmania<br>Recognize the symptoms of cutaneous, mucocutaneous, and visceral leishmaniasis |
| Physical | Be able to:<br>Recognize the clinical findings of cutaneous, mucosal, and visceral leishmaniasis<br>Recognize the complications of untreated leishmaniasis |
| Diagnosis | Be able to:<br>Order appropriate tests to diagnose leishmaniasis and complications of leishmaniasis |
| Management | Know the toxicities of the medications<br>Be able to: |

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| | Plan an appropriate treatment regimen for leishmaniasis<br>Determine when surgical consultation is appropriate |
| Trypanosomiasis | |
| History | Know the epidemiology of Trypanosoma cruzi and Trypanosoma brucei<br>Be able to:<br>Elicit a history that elucidates risk of infection with the parasite<br>Recognize symptoms of Chagas disease<br>Recognize symptoms of African sleeping sickness (African trypanosomiasis) |
| Physical | Be able to:<br>Recognize the early clinical manifestations of Chagas disease<br>Recognize the cardiac manifestations of chronic Chagas disease<br>Recognize the clinical manifestations of African sleeping sickness |
| Diagnosis | Be able to:<br>Plan the diagnostic evaluation of a child with suspected Chagas disease (eg, specific diagnostic tests and assessment of complications)<br>Plan the diagnostic evaluation of a child with suspected African sleeping sickness |
| Management | Be able to:<br>Plan the treatment of a child with Chagas disease<br>Plan the treatment of a child with African sleeping sickness |

Updates:

October 24, 2013 – Malaria updated and revised
October 24, 2013 – Tuberculosis updated and revised

## *Metabolism (see also Endocrinology)*

| **General**<br>By the end of training, the resident should: | |
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| History | Understand the basic pathophysiology and biochemical aspects of inborn errors of metabolism<br>Know the inheritance patterns of common genetically determined metabolic disorders<br>Know which metabolic disorders are associated with learning difficulties<br>Know the causes of metabolic bone disease<br>Know the common clinical presentations of metabolic disease including encephalopathy, seizures, neurodevelopmental delay or regression, muscle weakness, failure to thrive and hypoglycemia<br>Know that although individually rare, collectively, inborn errors of metabolism affect about 1-2% of individuals<br>Be able to:<br>Obtain a family history in particular consideration of unexplained death in infancy<br>Detail comprehensively the range of symptoms with which a child with an inborn error of metabolism may present |
| Physical | Be able to:<br>Elicit the common signs seen in metabolic disease (eg, visceromegaly, rickets, neuro-developmental delay, seizures, dysmorphic features) |
| Diagnosis | Understand the common biochemical findings in an acutely ill newborn or child presenting with metabolic disease including hypoglycemia, hyperammonemia, lactic or metabolic acidosis<br>Know the importance of collecting samples for investigation at presentation before therapies are commenced<br>Know which body fluids should be used for investigations (eg, blood, urine, cerebro-spinal fluid, tissue)<br>Know which disorders are part of routine neonatal screening in your country<br>Be able to: |

## *Metabolism (see also Endocrinology)*

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| | Select appropriate screening investigations in an infant or child in whom a metabolic disorder is suspected<br><br>Interpret investigations, if necessary in consultation with a biochemist or specialist, to either establish a diagnosis or determine further investigations that are necessary |
| Management | Understand the principles of management of metabolic diseases is to either induce activity or to counter-act the biochemical disturbance by diet or pharmacological therapy<br><br>Understand the principles of dietary treatment of metabolic disorders<br><br>Be aware of those metabolic disorders which are vitamin responsive or responsive to pharmacological treatment<br><br>Be aware of the educational and social implications of metabolic disorders (eg, need for special diets)<br><br>Be able to:<br><br>Manage acute symptoms of presentation (eg,seizures, hypoglycemia)<br><br>Plan the appropriate initial response to a positive neonatal screening test for metabolic diseases and be able to discuss this with the family<br><br>Manage timely and effective referral to specialists for patients at risk of, or presenting with, a metabolic disorder<br><br>Work collaboratively with dieticians and metabolic specialists to plan for the chronic management<br><br>Work collaboratively with a range of other specialists to provide long term care of complications of inborn errors of metabolism<br><br>Work with others in providing support in the community (eg, special diets or avoidance of factors which may precipitate symptoms)<br><br>Refer the family of a child with a metabolic disease for genetic counseling when necessary |

| **Metabolic defects/disorders/diseases**<br>By the end of training, the resident should: |
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## *Metabolism (see also Endocrinology)*

| Disorders of amino-acid metabolism (including phenylketonuria, tyrinosinemia, homocystinuria, urea cycle disorders, organic acidemias) | |
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| History | Understand that although the majority of amino-acid disorders are defects of catabolism, abnormalities also exist in biosynthesis and transport<br><br>Know the current newborn screening for inborn error of amino acid metabolism in the area<br><br>Understand the natural history of treated and untreated phenylketonuria<br><br>Understand the implications of maternal phenylketonuria<br><br>Know that most children with tyrinosinemia present early in infancy with failure to thrive, liver dysfunction and symptoms of Fanconi syndrome<br><br>Know the presentation of children with urea cycle disorders (neonates: coma, acute metabolic crisis, infancy: vomiting, failure to thrive, neurological symptoms; mild late forms that may not present until adulthood)<br><br>Know the inheritance patterns of disorders of amino acid metabolism<br><br>Know that organic acidemias (eg, maple syrup urine disease, proprionic acidemia, methylmalonic academia) present soon after birth with vomiting, lethargy, neurological symptoms |
| Physical | Know that the physical features of disorders of amino acid disorders are rarely diagnostic and that diagnosis needs to be suspected on history with laboratory confirmation<br><br>Be able to:<br><br>Detect the physical finding of homocysteinuria (eg, lenticular subluxation, Marfanoid habitus, developmental delay, thrombo-embolism) |
| Diagnosis | Understand that transamination of amino-acids to corresponding keto-acid is an early step in amino acid metabolism and thus accumulation of organic acids is the primary biochemical manifestation of many amino-acid disorders<br><br>Know it is important to check results of phenylketonuria screening in any child with neurodevelopmental delay<br><br>Know when it is appropriate to consider tyrinosinemia in a child presenting with liver dysfunction |

## *Metabolism (see also Endocrinology)*

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| | Know that homocysteine is not detected in usual assays of amino acids in body fluids, but that elevated homocysteine can be detected in blood and urine<br><br>Know that all children with coma should have a blood ammonia measured<br><br>Know that unexplained acidosis, with or without ketosis, should always suggest a possibility of an organic academia and demands urgent evaluation<br><br>Know that mutation analysis can be used for pre-natal detection and carrier detection of most disorders of amino acid metabolism<br><br>Be able to:<br><br>Select appropriate investigations when:<br><br>- neonatal screening for phenylketonuria is positive<br>- abnormal liver function may be due to tyrinosinemia<br>- a child presents with hyperammonemia<br>- a child presents with unexplained metabolic acidosis |
| Management | Know that it is recommended to continue phenylalanine restriction for life in phenylketonuria to prevent neurological manifestations<br><br>Know which other disorders of amino acid metabolism require strict dietary restriction (eg, maple syrup urine disease)<br><br>Know that drug therapy is available to block tyrosine metabolism and thus prevent accumulation of toxic metabolites which has greatly improved prognosis<br><br>Know that homocystinuria responds to pyridoxine<br><br>Know that arginine and sodium benzoate are of value in reducing ammonia levels in some urea cycle defects<br><br>Be aware of the role of liver transplantation in some disorders of amino acid metabolism (eg, urea |

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| | cycle disorders, methylmalonic academia)<br>Be aware of medications that are used in the treatment of organic acidemias (eg, L carnitine in proprionic academia, B12 in methyl malonic academia)<br>Be able to:<br>Provide initial support for acute presentations (eg, metabolic acidosis, hyperammonemia, hypoglycemia)<br>Work collaboratively with dieticians and metabolic specialists to provide long term follow up and surveillance of disorders of amino acid metabolism<br>Refer to geneticists as appropriate |
| Disorders of carbohydrate metabolism(eg, galactosemia, hereditary fructose intolerance, glycogen storage diseases) | |
| History | Know that children with galactosemia become sick soon after ingesting milk<br>Know the range of symptoms with which a child with galactosemia may present (eg, persistent jaundice, vomiting, failure to thrive, hypoglycemia)<br>Know that children with fructose intolerance usually present during weaning as breast milk and most infant formulae do not contain fructose<br>Know the range of symptoms with which fructose intolerance may present (eg, vomiting , hypoglycemia)<br>Know that children with glycogen storage diseases may present predominantly with problems related to the liver (eg, hypoglcemia, hepatomegaly, or liver dysfunction) or muscle (eg, poor exercise tolerance, rhabdomyolisis) |
| Physical | Be able to:<br>Detect hepato-splenomagaly which may be seen in galactosemia, fructose intolerance, and glycogen storage diseases<br>Detect cataracts which may be seen in galactosemia |
| Diagnosis | Know the current newborn screening for galactosemia in the area |

## *Metabolism (see also Endocrinology)*

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| | Know that testing the urine for reducing substances to establish a diagnosis of galactosemia must be done after starting milk<br>Know that galactosemia and fructose intolerance are associated with Fanconi syndrome<br>Understand the role of liver or muscle biopsy in establishing a diagnosis of a glycogen storage diseases<br>Be able to:<br>Select appropriate investigations after a positive neonatal screening test or after finding reducing substances in the urine |
| Management | Know that acute abnormalities are completely reversed in galactosemia and fructose intolerance by complete elimination of galactose or fructose from the diet.<br>Be aware that glycogen storage diseases require a high carbohydrate diet but that even optimal treatment may not reverse all the symptoms<br>Know that in muscle phosphorylase deficiency (eg, glycogen storage disease type V) treatment is symptomatic and consists of avoidance of strenuous exercise<br>Be able to:<br>Provide initial support for acute presentations (eg, hypoglycemia, rhabdomylosis)<br>Work collaboratively with dieticians and metabolic specialists to provide long term follow up and surveillance of carbohydrate metabolism disorders<br>Provide advice to families and schools about management around exercise in children with glycogen storage diseases especially those with predominantly muscle involvement |
| Disorders of lipid and lipoprotein metabolism | |
| History | Know that disorders of lipid and lipoprotein metabolism are relatively common and often genetic<br>Know that detection of dyslipidemia or early onset of cardiovascular disease in parents may be an indication for children to be screened<br>Be aware of the classification of hyperlipidemia based on lipoprotein accumulation (eg, Fredrickson |

## *Metabolism (see also Endocrinology)*

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| | types 1-V)<br>Know that disorders associated with hypertriglyceridemia may present with recurrent pancreatitis |
| Physical | Be able to:<br>Detect corneal arcus<br>Identify tendon, tuberose, and palmar xanthomas |
| Diagnosis | Be able to:<br>Select and interpret, with the help of a biochemist or metabolic specialist, lipid profile investigations |
| Management | Know that familial hypercholesterolemia is associated with myocardial infarction and death in childhood without aggressive treatment which may include low density lipoprotein apheresis<br>Know that the main treatment for hyperlipidemia is lifestyle modification<br>Know that although a low fat low cholesterol diet in children is safe, more restrictive diets should be avoided<br>Know that drug therapy is usually avoided in childhood except in those with very severe disease (eg, familial hypercholesteremia)<br>Know the drug therapies that are available (eg, fibrates, statins)<br>Be able to:<br>Advise on lifestyle modification<br>Work collaboratively with dieticians and metabolic specialists to provide long term follow up and surveillance of lipid and lipoprotein metabolism disorders<br>Refer to geneticists as appropriate |
| Disorders of metal metabolism (Menke's disease, Wilson disease, hemachromatosis) | |
| History | Know that Menke's disease is an X linked disorder causing defective absorption of copper resulting in severe developmental delay and failure to thrive |

## *Metabolism (see also Endocrinology)*

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| | Know that Wilson disease is an X linked disorder that causes defective transport of copper<br>Know that children with Wilson disease most commonly present with liver disease in the first or second decade<br>Know that neurologic symptoms of Wilson disease are more common after adolescence and may present with deterioration of school performance or mood disturbances<br>Know that hemachromatosis is a common autosomal recessive disorder, usually asymptomatic in children, but that there is a rare neonatal form |
| Physical | Know that it may be necessary to use a slit lam to see Kayser Fleisher rings and that these are often not present in childhood Wilson disease<br>Be able to:<br>Recognize the characteristic features of Menkes disease (eg, 'kinky hair')<br>Detect extrapyramidal signs if present in Wilson disease |
| Diagnosis | Know the value and limitations of serum copper and ceruloplasmin measurements in Menkes and Wilson disease<br>Be able to:<br>Interpret measurements of copper excretion to distinguish between carriers and pre-symptomatic patients with Wilson disease<br>Select and interpret measurements of iron status to establish a diagnosis of hemachromatosis |
| Management | Know that newer treatments have superseded the use of penicillamine in Wilson disease<br>Know that liver transplantation is effective in Wilson disease<br>Be able to:<br>Work collaboratively with dieticians and metabolic specialists to provide long term follow up and surveillance of disorders of metal metabolism disorders<br>Refer to geneticists as appropriate |

## *Metabolism (see also Endocrinology)*

| Disorders of fatty acid metabolism | |
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| History | Know that fatty acid metabolism have one of three phenotypes (eg, sudden infant death, hypoketotic hypoglycemia or recurrent rhabdomyolosis and myoglobinuria)<br>Know that sudden infant death may be in association with hypoglycemia with an acute current illness or due to cardiac dysrhythmias<br>Know that medium chain acyl coA dehydrogenase( MCADD) deficiency is the commonest fatty acid oxidation defect and typically presents with fasting or illness induced hypoketotic hypoglycemia<br>Know that defects in long chain fatty acid metabolism( VLCAD) present in a similar way to MCAAD but often more severe<br>Know whether newborn screening is available in your area<br>Know that all are inherited as autosomal recessive and that specific gene defects have been identified for most of the disorders |
| Physical | Know that the physical features of disorders of fatty acid metabolism are rarely diagnostic and that diagnosis needs to be suspected on history with laboratory confirmation |
| Diagnosis | Know that fatty acid oxygenation defects should be sought in any patient with encephalopathy, myopathy, cardiomyopathy, unexplained liver disease or hypoglycemia<br>Know that fatty acid metabolites from which the diagnosis can be made are often detected during acute crises but may be normal between episodes<br>Be able to:<br>Select appropriate initial investigations when disorder of fatty acid metabolism is suspected (eg, urine organic acids and plasma carnitine) |
| Management | Know the value and limitations of avoidance of fasting and ready provision of non-fat calories during stress<br>Know about the role of L carnitine to reverse the deficiencies and to promote excretion of toxic metabolites<br>Know about the role of dietary long chain fatty acid restriction and use of medium chain triglyceride |

## *Metabolism (see also Endocrinology)*

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| | as an alternative energy source in VLCAD<br>Be able to:<br>Work collaboratively with dieticians and metabolic specialists to provide long term follow up and surveillance of disorders of fatty acid metabolism |
| Lysosomal storage disorders (including sphingolipidoses and mucopolysaccaridoses) | |
| History | Know that lysosomal diseases are rare although some are more frequent in certain populations (eg, Tay Sachs and Gauchers in Ashkenazim)<br>Know which are not inherited in an autosomal recessive manner (eg, Hunters and Fabrys: X linked)<br>Know that in most lysosomal storage diseases the child is initially asymptomatic but this is followed by a chronic progressive course<br>Know that lysosomal storage diseases should be considered in any child presenting with neurodevelopmental regression or coarsening of facial features.<br>Know that bone infiltration can cause bone pain and lead to misdiagnosis |
| Physical | Be able to:<br>Identify signs that may be present including hepatosplenomegaly and coarse facial features<br>Identify eye signs that may be present (eg, corneal clouding, 'cherry red' spot, corneal opacities) |
| Diagnosis | Know that diagnostic evaluation of lysosomal storage diseases is complex and testing involves a cascade of biochemical and genetic tests<br>Know that prenatal diagnosis is available for almost all disorders<br>Know whether population screening is present in your area (eg, for Tay Sachs)<br>Be able to:<br>Select appropriate screening investigations(eg, urinary glycosoaminoglycans, oligosaccarides)<br>Select and interpret, with the help of a biochemist or metabolic specialist, further |

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| | investigations including enzyme assays<br>Select appropriate radiological investigations for muco-polysaccharidoses and identify radiographic features |
| Management | Know that enzyme replacement therapy is available for a number of storage disorders (eg, Gaucher disease, Fabry disease, Hurler syndrome)<br>Be able to:<br>Provide supportive care for those disorders associated with progressive neurodegeneration<br>Work collaboratively with metabolic specialists to provide long term follow up and surveillance of disorders of lysosomal stoage disorders<br>Refer to geneticists as appropriate<br>Consult with a range of other specialists that may be needed to provide long term care of complications (eg, cardiologists for cardiomyopathy, orthopedic surgeons and for skeletal problems, ophthalmologists for eye involvement, and physical therapists for neurologic and skeletal problems) |
| Disorders of purine and pyrimidine metabolism | |
| History | Understand that uric acid is the endpoint of the purine pathway so the most common symptoms are gout and nephrolithiasis, but disorders may present with hematologic, neurologic, musculoskeletal or immunologic problems<br>Know that Lesch Nyhan syndrome is a disorder of purine metabolism and is inherited as an X linked recessive<br>Know that the initial symptoms of Lesch Nyhan may be pink staining of the diapers followed by severe choreoathetosis<br>Know that disorders of pyramdine metabolism show phentotypic/ genotypic heterogeneity |
| Physical | |
| Diagnosis | Know that for disorders of purine metabolism the initial suspicion comes from the clinical |

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| | presentation backed up by elevated plasma uric acid levels |
| Management | Know that neurologic problems of Lesch Nyhan can only be marginally helped by standard drugs for movement disorders<br>Know that few disorders of pyramidine metabolism are treatable beyond supportive measures<br>Be able to:<br>Prescribe allopurinol to control uric acid levels in disorders of purine meatbolism<br>Provide supportive care for patients with neurological difficulties<br>Work collaboratively with metabolic specialists to provide long term follow up and surveillance of disorders of purine and pyramidine metabolism<br>Consult with a range of other specialists that may be needed to provide long term care of complications |
| Porphyrias | |
| History | Understand that the porphyrias are a group of disorders resulting from inherited or acquired abnormalities in heme synthesis<br>Know that acute intermittent porphyria is inherited as an autosomal dominant<br>Know that symptoms of acute porphyria before puberty are rare<br>Know the common presentations of acute porphyria eg,abdominal pain, motor neuropathy and psychiatric symptoms<br>Be able to:<br>Elicit a history of drugs that may precipitate acute porphyria |
| Physical | Be able to:<br>Identify photosensitive skin lesions if present |
| Diagnosis | Know that urine porphyrins are raised during an acute attack of porphyria<br>Know that specific enzyme testing is available |

## *Metabolism (see also Endocrinology)*

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| | Be able to:<br>Select appropriate screening investigations when porphyria is suspected |
| Management | Be able to:<br>Be able to manage an acute porphyria crisis (eg, IV fluids, pain relief and Heme arginate)<br>Work collaboratively with metabolic specialists to provide long term follow up and surveillance of porphyrias |

## *Musculoskeletal Disorders*

NOTE: Musculoskeletal Disorders frequently require a team of specialists such as physiotherapists, orthopedists and rheumatologists to jointly plan and enable recovery. The fully trained resident should be able to utilize the help of such specialists where it is important for accurate diagnosis and treatment.

| **Congenital**<br>By the end of training, the resident should: | |
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| General body | |
| Osteogenesis imperfect (OI) | |
| History | Know the inheritance pattern of OI<br>Understand the association of deafness with osteogenesis imperfecta<br>Understand the importance of family history in osteogenesis imperfecta<br>Know the importance of history pointing towards complications of OI- Cardiopulmonary and neurological |
| Physical | Be able to:<br>Recognize the clinical features osteogenesis imperfecta<br>Identify the “triad” of osteogenesis imperfecta<br>Evaluate for deformities and fractures<br>Identify the signs of complications of OI, cardiopulmonary, and neurological disorders |
| Diagnosis | Be able to:<br>Utilize collagen biochemical studies in skin biopsy to assist in forming a diagnosis<br>Utilize molecular studies as appropriate<br>Recognize role and limitations of prenatal detection of OI by ultrasonography |
| Management | Understand the types of osteogenesis imperfecta with their respective prognoses<br>Be able to:<br>Advise parents that there is no cure for this disorder |

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| | Assist in developing a plan for physical therapy, rehabilitation aids, need for braces to prevent fractures and deformity, and orthopedic management for fracture and deformity |
| Chondrodysplasias | |
| History | Know the inheritance pattern of achondroplasia<br>Understand the importance of looking for involvement of other systems, including neurological, ophthalmological, respiratory and dermatological systems<br>Understand the significance of apnea in a patient with achondroplasia |
| Physical | Be able to:<br>Recognize the presenting signs of various types of chondrodysplasia<br>Recognize the clinical signs of the complications of achondroplasia<br>Recognize signs of involvement of other systems, including neurological, ophthalmological, respiratory and dermatological systems |
| Diagnosis | Be able to:<br>Identify the radiological appearance of common types of chondrodysplasia<br>Utilize molecular genetics for making a diagnosis<br>Differentiate non-lethal from lethal types of chondrodysplasia |
| Management | Understand the incurability of chondrodysplasia<br>Understand the importance of prevention and correction of skeletal deformities, and the treatment of non-skeletal complications<br>Be able to:<br>Refer for genetic counseling as appropriate<br>Plan psychological and physical rehabilitation for patients<br>Advise parents of the value of avoiding contact sports, obesity, and proper dental care |

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| | Appropriately refer for surgical and pharmacological limb lengthening procedures |
| Arthrogryposis | |
| History | Know the presenting complaints of arthrogryposis, which are mainly joint contractures<br>Be able to:<br>Obtain a history regarding involvement of other joints, deformities, and higher mental functions |
| Physical | Be able to:<br>Recognize the common patterns of involvement (eg, quadrimelic, monomelic)<br>Recognize the common deformities at the elbow, wrist and hand, feet, knees, and hips |
| Diagnosis | Understand the radiologic features of the common deformities and dislocations<br>Understand the value of screening x-rays of apparently uninvolved regions such as spine and hips |
| Management | Be able to:<br>Refer for physical therapy, casting, orthoses, fracture management, and surgery, as appropriate |
| Head and neck | |
| Torticollis | |
| History | Understand the various etiologies of congenital torticollis<br>Know the most common cause is muscular torticollis, resulting from birth injury<br>Understand torticollis arising later in childhood may be secondary to trauma or respiratory illness |
| Physical | Be able to:<br>Recognize the typical posture of the neck in torticollis<br>Thoroughly examine the cervical spine movements<br>Provide neurologic and ocular examination in a case with torticollis |

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| Diagnosis | Be able to:<br>Recognize that the differential diagnosis of torticollis includes head tilt secondary to malformation of the cervical spine, visual disturbance, posterior fossa tumor, etc<br>Differentiate between congenital and paroxysmal torticollis<br>Properly utilize radiological investigations in identifying torticollis |
| Management | Be able to:<br>Recommend physical therapy (eg, stretching) of the neck as a successful treatment for torticollis<br>Refer to orthopedic specialist in cases not responding to treatment |
| Klippel-Feil syndrome | |
| History | Understand the clinical "triad" of Klippel Feil syndrome<br>Understand the association of Klippel Feil syndrome with other congenital anomalies (eg, renal)<br>Be aware of Sprengel anomaly and its association with scoliosis and torticollis |
| Physical | Be able to:<br>Recognize the components of the clinical triad<br>Complete a full neurological examination |
| Diagnosis | Be able to:<br>Identify the radiologic features of Klippel-Feil syndrome and know the radiographic views required<br>Include the association of urinary tract abnormalities in the differential |
| Management | Be able to:<br>Provide for the management of complications<br>Refer for surgical management when necessary |

## *Musculoskeletal Disorders*

| Trunk and spine (eg, tethered cord, occult spina bifida) | |
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| History | Know that congenital scoliosis is associated with other congenital abnormalities and can affect other areas such as the pelvis<br>Know that spinal deformities may be secondary to other pathologies (eg, infective, paralytic)<br>Know the role of folic acid in prevention of myelomeningcele<br>Know the presenting features of various spinal disorders (eg, deformity, paralysis, lack of bladder and bowel control, presence of a sac or cyst on the skin)<br>Understand that family history is important in deformities/disorders of spine |
| Physical | Be able to:<br>Identify external appearance of various types of spinal dysraphism<br>Perform a detailed neurologic examination and identify the types for neurologic deficits seen in various disorders<br>Evaluate other organ systems in a case of spinal disorder |
| Diagnosis | Know the indications and limitations of antenatal diagnosis of neural tube defects<br>Be able to:<br>Differentiate between mobile and fixed spinal deformities<br>Identify the radiological appearance of spina bifida, scoliosis, and kyphosis |
| Management | Be aware of the indications for surgical interventions in these disorders<br>Be able to:<br>Utilize multispecialty involvement in the management of spina bifida<br>Refer parents for training about the management of paralytic bladder and bowel, and to physical and occupational therapy as required<br>Ensure periodic urine cultures and assessment of renal function (eg, renal scans, vesiculourethrograms, renal ultrasonography, cystometrograms) in the management |

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| | Recognize that deterioration of ambulatory function, may indicate tethered spinal cord<br>Refer parents regarding the role of orthosis, canes, and other ambulation assisting devices |
| Extremities | |
| Clubfoot | |
| History | Know that clubfoot has a certain bilateral incidence<br>Be able to:<br>Rule out other causes of equinovarus in a child (eg, paralytic causes, arthrogryposis) |
| Physical | Be able to:<br>Recognize the most common component of clubfoot (ie, equinovarus deformity)<br>Understand the components of clubfoot deformity in forefoot, midfoot, hindfoot, and ankle<br>Recognize the physical features of other causes of clubfoot and look for the same during the musculoskeletal and neurological examination |
| Diagnosis | Be able to:<br>Differentiate positional clubfoot from congenital clubfoot<br>Recognize the radiological diagnosis of clubfoot |
| Management | Be able to:<br>Refer for casting or splinting of the affected foot for children with talipes equinovarus<br>Plan the early treatment of clubfoot as it is critical to successful correction<br>Refer for surgical correction in cases of clubfoot non-responsive to conservative treatment |
| Metatarsus valgus, varus | |
| History | Understand the possibility of other associated musculoskeletal and neuromuscular abnormalities |
| Physical | Be able to:<br>Complete a thorough evaluation of spine and other joints (eg, hip joints) |

## *Musculoskeletal Disorders*

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| Diagnosis | Be able to:<br>Differentiate between that metatarsus varus/ valgus and clubfoot<br>Differentiate between flexible and rigid metatarsus valgus and varus<br>Identify the radiological features of metatarsus valgus and varus<br>Use radiological screening of hips and spine for making diagnosis |
| Management | Understand that if the forefoot can be abducted/ adducted (in case of varus and valgus respectively) past the midline, massage and exercise are usually sufficient to treat metatarsus valgus/varus<br>Be able to:<br>Refer for casting/surgical treatment in a minority of cases as required |
| Developmental dysplasia, subluxation of the hips (DDH) | |
| History | Know that developmental dysplasia of the hips is more likely in girls and in infants who are born by breech presentation<br>Know that isolated hip clicks are unlikely indicators of dysplasia<br>Know the conditions leading to tight intrauterine space are risk factors<br>Understand that a positive family history is important<br>Understand that the presenting features may be asymmetric thigh folds, limb length discrepancy, limping or waddling |
| Physical | Know that initially there may be no abnormal signs of subluxation of the hip in developmental dysplasia of the hip(s)<br>Know the method and interpretation of performing the Barlow provocative maneuver, Ortolani test, and hip clicks vs clunk<br>Know the 2-3 months old or older infant may not show above tests, may have other signs including limited hip abduction/shortening/asymmetrical thigh folds/Galleazi sign/Klisic test<br>Be able to: |

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| | Identify asymmetry of the gluteal and thigh folds as a sign of possible subluxation of the hip<br>Recognize when Trendelenbergs signs are positive for older children |
| Diagnosis | Understand the use of specific line measurements to determine the relationship of the femoral head to the acetabulum for radiological interpretation of DDH<br>Be able to:<br>Utilize ultrasonography for confirmation of the diagnosis of developmental dysplasia of the hip(s) in young infants<br>Conduct a clinical examination in a child 0-4 weeks, as this is preferred over ultrasonography to avoid false positive<br>Order radiological assessment only when femoral epiphysis begins to ossify (approximately 4-6 months) |
| Management | Know that abduction diapers have no role in treatment of DDH<br>Understand the principles of closed reduction, concept of safe zone, and indication of open reduction<br>Be able to:<br>Recommend the Pavlik Harness as soon as diagnosis is made with a positive Barlow or Ortolani test, and may be effective in a large majority of patients < 6 months , but only 50% of patients > 6 months of age<br>Properly position and use proper precautions of Pavlik harness<br>Refer for orthopedic consultation when spontaneous reduction does not occur quickly with the Pavlik Harness or when DDH is detected later in infancy |
| Coxa valgus, vara | |
| History | Know that coxa valga and vara may present with painless limp and limb length discrepancy<br>Know that coxa vara and valga may result from varying reasons including infantile form trauma |
| Physical | Be able to: |

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| | Recognize the physical findings of coxa valgus/varus<br>Measure true and apparent limb lengths correctly, elicit Trendelenberg's sign and gait, and articulate the implications of each |
| Diagnosis | Be able to:<br>Identify the radiological characteristics of coxa vara and valga (eg, neck-shaft angle)<br>Identify the Fairbank's triangle on radiologic examination |
| Management | Be able to:<br>Provide the essentials of corrective femoral osteotomies |
| Plano valgus | |
| History | Understand the possible association of plano valgus with various neuromuscular and musculoskeletal abnormalities<br>Understand the presentations of congenital and acquired plano valgus |
| Physical | Be able to:<br>Recognize the physical features of congenital vertical talus, and other neuromuscular and musculoskeletal abnormalities associated with plano valgus foot<br>Perform a complete examination of spine, hips, and other joints in a patient with plano valgus deformity |
| Diagnosis | Be able to:<br>Differentiate clinically between flexible and rigid plano valgus<br>Identify the radiological appearance of rigid forms of planovalgus deformity |
| Management | Know that treatment for plano valgus is rarely required in childhood<br>Be able to:<br>Recommend a longitudinal arch support if plano valgus is painful for adolescents |
| Femoral anteversion, tibial torsion | |

## *Musculoskeletal Disorders*

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| History | Know that femoral anteversion and tibial torsion vary with age<br>Be aware of that femoral anteversion and tibial torsion have familial patterns |
| Physical | Be able to:<br>Evaluate a child with femoral anteversion<br>Recognize that toe-walking may be a normal stage in gait development or may reflect underlying pathologic conditions such as neuromuscular disease |
| Diagnosis | Understand that x-ray studies are not necessary for the diagnosis of femoral anteversion |
| Management | Know which patients should be treated<br>Be able to:<br>Reassure parents that the natural history of femoral anteversion is self-correction |
| Polydactyly | |
| History | Know that polydactyly is the commonest congenital toe deformity<br>Know that it may be associated with Ellis-van Creveld, longitudinal deficiency of the tibia, and Down syndrome |
| Physical | Be able to:<br>Recognize the extra digit and know that it can be rudimentary or well formed |
| Diagnosis | Be able to:<br>Interpret X-rays to determine if the digit is rudimentary or well formed |
| Management | Be able to:<br>Plan appropriate management of polydactyly<br>Know that you should never “tie-off” the digit |
| Leg length discrepancy | |
| History | Know that leg length discrepancy may be apparent and real |

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| | Know that leg length discrepancy may be because of pathology in any of the joints or the bones<br>Know that limb length discrepancy may result from varying disorders of the bones or joints (eg, inflammatory, traumatic, infective) |
| Physical | Be able to:<br>Recognize leg length discrepancy and know that it may be associated with abnormal abduction of the hip (ie, apparent limb length discrepancy)<br>In the presence of leg length discrepancy, perform examination of all the joints of the limb<br>Properly use fixed bony landmarks for measuring various components of limb length in both upper and lower limbs<br>Recognize the difference between short limb gait, Trendelenberg gait, and antalgic gait |
| Diagnosis | Be able to:<br>Interpret the radiological findings as they are crucial in diagnosing the cause of limb length discrepancy including disorders of the joint or bones |
| Management | Be able to:<br>Manage limb length discrepancy using a shoe rise (effective to a certain extent)<br>Manage limb length discrepancy, to a certain extent, by compensation using a pelvic tilt<br>Refer for limb lengthening surgeries as appropriate |

| **Acquired**<br>By the end of training, the resident should: | |
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| Infections (see also ***Infectious Diseases***) | |
| Osteomyelitis | |
| History | Know that osteomyelitis usually begins with an episode of bacteremia<br>Know that the most common bacterial cause of osteomyelitis is Staphylococcus aureus<br>Understand that osteomyelitis generally occurs by hematogenous spread but may develop by local |

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| | extension<br>Know the age-related microbiology of osteomyelitis<br>Know that osteomyelits may be acute, subacute, and/or chronic<br>Know the age and site related incidence of acute osteomyelitis |
| Physical | Be able to:<br>Recognize the early clinical findings in osteomyelitis (eg, localized tenderness over the metaphysis and pain on weight bearing)<br>Recognize the physical signs in a patient with osteomyelitis of the pelvis<br>Recognize the differences between physical features of cellulitis and acute osteomyelitis |
| Diagnosis | Be aware that indicative x-ray findings in osteomyelitis do not generally appear until 10 to 14 days after infection<br>Be able to:<br>Attempt to confirm the bacterial etiology of osteomyelitis directly by aspiration of the metaphysis for culture and sensitivity and obtaining several blood cultures<br>Utilize bone scanning and magnetic resonance imaging in osteomyelitis as appropriate |
| Management | Be able to:<br>Plan for the management of osteomyelitis<br>Prescribe the appropriate antibiotic management of osteomyelitis |
| Arthritis (pyogenic) | |
| History | Know the most common organisms that cause pyogenic arthritis<br>Know that a common cause of pyogenic arthritis is spread from an adjacent osteomyelitis<br>Know the characteristics of arthritis associated with rheumatic fever<br>Know that untreated pyogenic arthritis of hip may have long term undesirable sequelae |

## *Musculoskeletal Disorders*

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| Physical | Be able to:<br>Recognize the viral causes of acute arthritis<br>Recognize the clinical manifestations of pyogenic arthritis in neonates compared with those in older children |
| Diagnosis | Be able to:<br>Distinguish between arthritis and arthralgia<br>Distinguish between pyogenic arthritis and toxic synovitis<br>Use the best laboratory tests to diagnose pyogenic arthritis (eg, joint aspiration, fluid analysis) |
| Management | Be able to:<br>Working with appropriate specialists, provide drainage of purulent fluid in pyogenic arthritis and particularly surgical drainage of hip and shoulder arthritis<br>Prescribe the appropriate antibiotic management of pyogenic arthritis |
| Synovitis | |
| History | Know that toxic synovitis is a disorder of exclusion<br>Know that septic arthritis should be definitively excluded before the diagnosis of toxic arthritis is made<br>Know that the hip joint is the common site<br>Know that these children are usually afebrile<br>Understand that these children are usually ambulatory with a limb |
| Physical | Be able to:<br>Recognize that the hip is not usually held in characteristic position of flexion abduction and external rotation |
| Diagnosis | Know that toxic synovitis is a diagnosed only on exclusion of other causes of arthritis including aspiration/ radiological and laboratory investigations as indicated |

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| | Be able to:<br>Formulate the differential diagnosis of a painful hip as it varies according to patient age and gender |
| Management | Be able to:<br>Provide supportive treatment for toxic synovitis |
| Trauma (see also ***Sports Medicine***) | |
| Dislocations | |
| History | Know the definition of dislocation<br>Know the typical mode of trauma causing hip, shoulder, and elbow dislocation<br>Know that recurrent dislocations are more likely when the initial dislocation occurs in a younger individual<br>Know that examination of neurovascular status of the limb is important after an acute dislocation |
| Physical | Understand the typical appearance of the joint after dislocation (eg, shoulder, hip, and elbow)<br>Be able to:<br>Recognize the historical and clinical manifestations of subluxation of the patella |
| Diagnosis | Understand that the utilization of x-rays are crucial in diagnosing dislocations |
| Management | Be able to:<br>Initiate rigorous quadriceps rehabilitation to prevent recurrence of dislocation of the patella<br>Refer for surgery in cases of recurrent dislocation of shoulder and patella |
| Ligamentous (sprains, strains) | |
| History | Know the common modes of injury causing knee ligament injuries and/or ankle sprains |
| Physical | Know that certain provocative tests may be required to evaluate integrity of ligaments<br>Understand that the presence or character of pain may be the dominant indicator of type and severity of ligament injuries |

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| | Be able to:<br>Recognize the clinical manifestations of various sprains<br>Recognize that an ankle injury in a prepubertal adolescent may be a growth plate fracture rather than an ankle sprain |
| Diagnosis | Be able to:<br>Use x-rays mainly to rule out bony injury<br>When indicated, use MRI for a detailed evaluation of integrity of ligament |
| Management | Be able to:<br>Plan for the acute management of sprains<br>Advise patient/parent that severe sprains require protection against another insult during their healing phase<br>Appropriately use, and recommend the use of, ice packs in soft tissue injury<br>Recommend rest, ice, compression, and elevation as the initial management of ankle sprain<br>Commence rehabilitation as soon as pain allows<br>Refer for bracing/other support in acute ligamentous injuries as recommended |
| Bone | |
| History | Know the significance of the compartment syndrome<br>Understand that occult fractures can cause gait disturbances in young children<br>Understand the importance of growth plate fractures and injuries<br>Understand that old growth plate injuries in children may manifest as deformity/ limb length discrepancy<br>Know the importance of evaluation of neurovascular status of the limb in fractures<br>Understand the meaning of compound fractures |

## *Musculoskeletal Disorders*

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| Physical | Be able to:<br>Recognize the hallmarks of fractures (ie, abnormal mobility, tenderness, swelling and absence of transmitted movements)<br>Recognize the common deformity in the limb seen with common fractures in children (eg, supracondylar fracture of humerus, fracture of shaft of femur) |
| Diagnosis | Be able to:<br>Use x-ray in diagnosing and characterizing fractures<br>Differentiate between displaced, un-displaced, comminuted, segmental, and spiral fractures |
| Management | Be able to:<br>Plan for the emergency treatment of fractures as appropriate<br>Provide closed reduction and immobilization as effective treatment for many fractures<br>Refer for surgical treatment as indicated by the nature of the fracture |
| Metabolic bone disease | |
| Vitamin D deficiency | |
| History | Understand that nutritional causes are the commonest but not the only cause of vitamin D deficiency<br>Understand the importance of history diet and exposure to sunlight<br>Understand that maternal Vitamin D provides enough stores for the first 1-2 months of life<br>Understand that many factors may result in lack of exposure to sunlight, including safety concerns, cultural issues, climate, etc<br>Understand that Vitamin D deficiency may be secondary to other factors (eg, drugs, malabsorption) |
| Physical | Understand that genu valgum and varum may be physiological<br>Be able to:<br>Recognize the clinical features of rickets |

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| | Recognize the features of rickets according to age groups |
| Diagnosis | Be able to:<br>Use the appropriate biochemical investigations for diagnosing rickets<br>Interpret the radiological features of rickets<br>Differentiate Vitamin D deficiency from other causes of rickets using laboratory investigations<br>Recognize the biochemical and radiological parameters of healing rickets |
| Management | Be able to:<br>Correctly prescribe the dose and schedule of Vitamin D administered for correction of Vitamin D deficiency<br>In the event of an inability to correct Vitamin D levels on Vitamin D supplementation, implement appropriate further investigations to look for other causes<br>Plan for the treatment of Vitamin D-dependent and Vitamin D-resistant forms of rickets<br>Plan the use of 25 OH Vitamin D, 1 25 OH Vitamin D and calcitriol in specific types of rickets<br>Refer for surgery for correction of deformities only after biochemical and radiological correction of rickets |
| Osteoporosis | |
| History | Know that osteoporosis is uncommon in children<br>Know the risk factors of osteoporosis<br>Know the value of drug history in evaluation of a child with osteoporosis<br>Know that immobilization due to any cause is one of the risk factors for osteoporosis<br>Be aware of the dietary and endocrine causes of osteoporosis in children<br>Know the inheritance pattern of osteoporosis pseudoglioma<br>Know the role of weight bearing |

## *Musculoskeletal Disorders*

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| Physical | Be able to:<br>Recognize the clinical features of secondary causes leading to osteoporosis |
| Diagnosis | Know that blood values of minerals, vitamin D metabolites, alkaline phosphatase, and parathyroid hormone are usually normal in osteoporosis<br>Know that osteoporosis may be identified by reduced values of bone mineral content and bone density in dual-energy x-ray absorptiometry or quantitative CT |
| Management | Be able to:<br>Plan for the treatment of secondary osteoporosis by correcting the primary cause<br>Prescribe the appropriate pharmacological agents available for treatment of osteoporosis |
| Miscellaneous | |
| Scoliosis | |
| History | Know that congenital scoliosis may be associated with other congenital abnormalities or disorder of other areas (eg, pelvis)<br>Know that apart from idiopathic variety, scoliosis may be secondary to other pathologies (eg, neuromuscular, congenital, myopathies, and limb length discrepancy)<br>Understand that family history is important in deformities/disorders of spine |
| Physical | Know that pulmonary function has to be evaluated in patients with progressing scoliosis<br>Be able to:<br>Recognize scoliosis as a complex deformity in all three planes<br>Recognize that asymmetry of the posterior chest wall on forward bending (the Adams test) is the earliest abnormality in scoliosis |
| Diagnosis | Know that age at diagnosis and degree of curve are important predictors of prognosis<br>Know that curves <30 degrees rarely progress after skeletal maturation and those >45 degrees often continue to progress |

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| | Be able to:<br>Differentiate between mobile and fixed scoliosis<br>Use radiological techniques to diagnose scoliosis<br>Quantify the degree of curvature radiologically |
| Management | Be able to:<br>Manage with observation and appropriate orthopedic referral for the treatment of scoliosi |
| Kyphosis | |
| History | Know that that kyphosis can be postural, congenital, due to Scheuermann disease, post traumatic, neoplastic or post infective (ie, tuberculosis of spine) |
| Physical | Know that kyphosis is a deformity in the sagittal plane convexity posteriorly<br>Know that kyphotic deformity can be at one level (knuckle), two or three levels (gibbus), or multiple levels (kyphus)<br>Know that kyphosis can be either flexible or rigid and that flexible kyphosis generally has no adverse physical effects<br>Be able to:<br>Elicit all types of kyphosis |
| Diagnosis | Know that pulmonary function has to be evaluated in patients with rigid kyphosis<br>Know that the normal thoracic kyphosis is ≤40 degrees<br>Be able to:<br>Interpret the radiological assessment of kyphosis including a supine hyperextension lateral view |
| Management | Be able to:<br>Plan the treatment objectives for kyphosis including pain relief, prevention of neurologic deficit, achievement of acceptable appearance, and good follow-up evaluation |

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| | Advise on bracing and exercise appropriately in management of kyphosis |
| Avascular necrosis (Legg-Calve-Perthes disease) | |
| History | Know that Legg-Calve-Perthes disease commonly occurs between 3 and 10 years of age<br>Know that boys are more likely to have Legg-Calve-Perthes disease than girls<br>Know that Legg-Calve-Perthes disease is bilateral in 10% of cases<br>Know that the most common complaint is limb with or without pain<br>Know that pain my actually be referred to the thigh and knee and hip may be missed as the primary site of pathology |
| Physical | Be able to:<br>Recognize the clinical features of Legg Calve Perthes disease<br>Evaluate if the gait is antalgic and particularly prominent after strenuous activity<br>Recognize limited hip motion, ie, primarily internal rotation and abduction<br>Recognize the prominent features of atrophy of the muscles of the thigh, calf, or buttock<br>Measure limb length for inequality and know that it may be true or apparent |
| Diagnosis | Be able to:<br>Consider Legg-Calve-Perthes disease in the differential diagnosis of a child with a limp<br>Recognize the radiological characteristics of Perthes disease<br>Recognize that widening of medial joint space is an early sign of Legg-Calve-Perthes disease<br>Use x-rays in making the diagnosis but also in prognostication and treatment planning |
| Management | Understand that goal of treatment in Legg-Calve-Perthes is preservation of a spherical well-covered femoral head and maintenance of normal hip range of motion that is close to normal<br>Know that management consists of containing the femoral head within the acetabulum using braces or surgical means, depending on the stage and severity of disease |

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| | Be able to:<br>Plan the initial treatment (ie, rest, protected weight bearing, and physiotherapy) |
| Apophysitis | |
| History | Understand the etiology of Osgood-Schlatter disease<br>Understand that apophysitis usually affects children during rapid growth<br>Understand that calcaneal apophysitis is the most common cause of heel pain in children |
| Physical | Be able to:<br>Recognize the clinical manifestations and clinical course of Osgood-Schlatter disease<br>Identify the common sites of apophysitis |
| Diagnosis | Be able to:<br>Interpret the radiological diagnosis of apophysitis at various sites<br>Consider apophysitis if symptoms are unilateral and not relieved on conservative management |
| Management | Be able to:<br>Plan for the management of apophysitis (ie, mainly activity modification, analgesics, and stretching exercises) |
| Slipped capital femoral epiphysis (SCFE) | |
| History | Understand that SCFE mainly affects adolescents<br>Know that SCFE can present as acute, chronic, and acute-on-chronic<br>Understand that presence of prodromal groin pain prior to slip distinguishes SCFE from a physeal injury<br>Understand the racial distribution of SCFE<br>Understand that SCFE is bilateral in 60% cases and that boys are affected more often than girls<br>Understand the influence of obesity on SCFE |

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| | Know that when SCFE occurs before puberty an endocrine disorder should be suspected (eg, hypothyroidism, growth hormone deficiency)<br>Be able to:<br>Recognize the presenting symptoms of a slipped capital femoral epiphysis in the acute, chronic, and acute-on-chronic forms |
| Physical | Know that the extremity is usually externally rotated on presentation<br>Be able to:<br>Recognize the typical restriction of specific movements in patients with SCFE |
| Diagnosis | Understand the diagnostic, prognostic, and therapeutic (treatment planning) use of radiographs (AP and "frogleg" lateral views) in patients with SCFE |
| Management | Understand that most accepted form of treatment of SCFE is *in situ* pinning with a single large screw<br>Be able to:<br>Plan the immediate admission and bed rest until definitive treatment of a patient with SCFE |
| Myositis | |
| History | Know the etiologies of myositis<br>Know that myositis is painful and may experience relief of pain with a residual tumor like mass<br>Know that myositis can follow influenza type B and enteroviral infections<br>Know that myositis may not always follow a history of trauma |
| Physical | Be able to:<br>Identify the common sites of myositis ossificans<br>Identify the difference in the presence of myositis as a firm or bony hard, tender or non-tender mass depending on the stage of maturation |
| Diagnosis | Know that alkaline phosphatase levels that are elevated initially and reduce as the myositis matures |

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| | Be able to:<br>Recognize the "zoning" phenomenon seen in myositis ossificans both on imaging and histopathological examination<br>Recognize the features of myositis on x-ray, MRI, and ultrasound<br>Recognize that acute myositis can result in significant myoglobinuria |
| Management | Be able to:<br>Plan the evaluation and management of a patient with myositis<br>Plan for the treatment of myositis as simple observation and surgical excision, if at all, only after radiological, clinical, and biochemical evidence of maturation of the myositis |
| Back pain | |
| History | Know that persisting back pain in prepubertal children is usually specific<br>Know the various causes of back pain in children<br>Know the characteristic difference between non-specific musculoskeletal pain and pain from serious causes<br>Understand the differences between persistent and non-persistent (eg, nocturnal) back pain in children |
| Physical | Be able to:<br>Perform an examination of spine<br>Perform a detailed neurological examination<br>Recognize the clinical signs of spondylolisthesis |
| Diagnosis | Be able to:<br>Formulate a differential diagnosis for back pain in children and adolescents |
| Management | Be able to: |

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| | Plan the evaluation of a patient with back pain<br>Formulate a management plan for a patient with spondylolisthesis |
| Bone cysts | |
| History | Understand that simple bone cysts are rare before 3 years and after skeletal maturity<br>Understand that majority of simple bone cysts are asymptomatic until pathological fracture occurs |
| Physical | Be able to:<br>Identify the common sites of simple bone cysts (eg, medullary portion of proximal femur and humerus)<br>Recognize the difference in clinical signs between a simple bone cyst and a malignant bone tumor |
| Diagnosis | Know the natural history and differential diagnosis of bone cysts<br>Be able to:<br>Interpret the radiological characteristics of a simple bone cyst |
| Management | Be able to:<br>Advise that simple observation may be indicated for an incidentally detected simple bone cyst<br>Formulate the treatment plan for a patient with a simple bone cyst with an impending or an actual pathological fracture |

## *Neonatal Care*

| **Fetus**<br>By the end of training, the resident should: | |
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| History | Understand the effects of antenatal and perinatal events on outcome<br>Know the normal aspects of fetal physiology and growth<br>Understand the causes of intra-uterine growth failure<br>Be able to:<br>Determine gestation of the fetus using maternal menstrual cycle history and ultrasound |
| Physical | Be able to:<br>Interpret intrauterine growth records |
| Diagnosis | Know the uses of antenatal ultrasound for diagnosing fetal development including determination of gestational age, fetus number and presentation, fetus size, fetal well- being, and volume of amniotic fluid<br>Understand the significance of fetal dysrhythmias<br>Know that the non-stress test is used to monitor fetal heart rate reactivity in response to fetal activity and to evaluate uteroplacental insufficiency<br>Know the factors used by obstetricians for evaluating fetal well-being (eg, fetal movements, fetal tone, fetal breathing, amount of amniotic fluid, heart rate) |
| Management | Know about strategies used by obstetricians for the prevention of fetal disease<br>Know about the management of fetal dysrhythmias |

| **Mother**<br>By the end of training, the resident should: | |
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| Maternal screening | |
| History | Know the common prenatal screening protocols and their implementation at appropriate times |
| Effects of maternal systemic disease on fetus and newborn | |
| History | Be able to: |

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| | Obtain a history from the mother about systemic disease during pregnancy |
| Physical | Know that obstetricians are able to search for presence of fetal malformations or anomalies using ultrasound and fetal MRI<br>Know that obstetricians are able to search for presence of fetal cardiac arrhythmias using echocardiography<br>Be able to:<br>Assess for dysmorphism in a newborn<br>Perform an EKG in a newborn with a cardiac arrhythmia |
| Diagnosis | Know the impact of specific maternal illnesses on the fetus and newborn (eg, insulin dependent diabetes, connective tissue disorders) |
| Management | Be able to:<br>Prescribe the management of infants born to mothers with specified illnesses |
| Oligohydramnios and polyhydramnios | |
| History | Be able to:<br>Determine the gestation at which oligohydramnios/polyhydramnios develops |
| Physical | Understand the effects of oligohydramnios on the fetus and newborn<br>Know how amniotic fluid volume is measured using ultrasound<br>Be able to:<br>Identify the fetal conditions associated with polyhydramnios<br>Identify the features in a newborn of the effects of oligohydramnios |
| Diagnosis | Know how olighydramnios and polyhydramnios are diagnosed in a pregnant woman |
| Management | Know how oligohydramnios and polyhydramnios are managed by obstetricians |
| Impact of maternal medications on fetus and newborn | |
| History | Be able to: |

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| | Obtain a history from the mother about medication use during pregnancy |
| Physical | Know that obstetricians can search for presence of fetal malformations or cardiac arrhythmias using ultrasound and fetal MRI<br>Be able to:<br>Assess for dysmorphism in a newborn |
| Diagnosis | Know the impact of specific drugs on the newborn (eg, Selective serotonin uptake inhibitor [SSRI ]withdrawal) |
| Management | Be able to:<br>Manage a newborn with SSRI withdrawal |
| Impact of maternal substance use and abuse on fetus and newborn | |
| History | Be able to:<br>Obtain a history from the mother about drug/substance use/abuse during pregnancy |
| Physical | Know that obstetricians can search for presence of fetal malformations using ultrasound and fetal MRI<br>Be able to:<br>Assess for dysmorphism in a newborn<br>Identify the physical findings associated with fetal alcohol syndrome |
| Diagnosis | Be able to:<br>Identify the impact of specific drugs on the fetus and newborn (eg, fetal alcohol syndrome)<br>Identify the impact of specific drugs on the newborn (eg, narcotic withdrawal)<br>Use neonatal abstinence scoring to diagnose substance use/abuse |
| Management | Be able to:<br>Apply management of drug withdrawal |
| Aspects of pregnancy, labor, and delivery that affect the newborn | |
| History | Know the gestation and number of fetuses at time of delivery |

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| | Know the mode of delivery and whether assisted delivery was required (eg, forceps/vacuum)<br>Know that most anesthetic and analgesic agents have a high degree of lipid solubility and a low molecular weight and are transferred rapidly across the placenta<br>Know that narcotics cross the placenta readily and cause dose-related respiratory depression<br>Be able to:<br>Determine the drugs (including anesthetic agents) administered to the mother during labor and delivery |
| Physical | Be able to:<br>Assess gestational age (Ballard or Dubowitz scoring)<br>Assess for birth trauma |
| Diagnosis | Be able to:<br>Diagnose preterm birth <37 weeks of gestation<br>Diagnose birth trauma (eg, caput succedaneum, cephalhematoma, subgaleal hemorrhage, chignon, peripheral nerve injury) |
| Management | Be able to:<br>Manage the care of preterm infants<br>Manage infants who have experienced birth trauma including peripheral nerve injuries<br>Manage respiratory depression in a newborn secondary to maternal narcotic administration |
| Risk determinants for preterm delivery (maternal and fetal) | |
| History | Know the risk factors for preterm delivery (eg, Premature rupture of membranes, preterm labor, multiple gestation, advanced maternal age, maternal-fetal complications of pregnancy) |
| Impact of multiple gestations | |
| History | Know the risks associated with monoamniotic and monchorionic twins (eg, twin-to-twin transfusion syndrome) and multiple gestations<br>Be able to: |

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| | Determine the number of fetuses<br>Assess if twins are monoamniotic and monochorionic, dichorionic, diamniotic, or otherwise |
| Physical | Know that antenatal ultrasound is used to determine gestational age, fetus number and presentation, fetus size, and fetal well- being |
| Diagnosis | Know methods used to determine how the fetuses are growing (ie, appropriate growth versus discordant)<br>Know how the presence of intra-uterine growth retardation (IUGR) is identified |
| Management | Know how the following conditions are managed during pregnancy:<br>IUGR<br>Growth discordance<br>TTTS (twin-to-twin transfusion syndrome) |
| Impact of reproductive technologies (including ethical issues) | |
| History | Determine what reproductive technology was used (eg medications such as clomiphene, in vitro fertilization, intr-uterine insemination, intracytoplasmic sperm in jection)<br>Know the ethical implications of assisted reproductive technologies |

| **Normal newborn infants**<br>By the end of training, the resident should: | |
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| Nomenclature and definitions | |
| | Preterm (< 37 wk gestational age)<br>Term ( 37 - 42 wk gestational age)<br>Post-term (>42 wk gestational age) |
| Delivery | |
| Physical | Know that a normal newborn infant can fixate<br>Understand the components of the Apgar score |

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| | Understand the significance of the one- and five-minute Apgar scores<br>Be able to:<br>Determine the Apgar scores at appropriate times (1, 5 and 10 minutes)<br>Examine the newborn baby appropriately and with sensitivity<br>Determine the gestational age of a newborn using either the Ballard or Dubowitz scoring systems<br>Perform an accurate assessment of the baby at birth including heart, pulses, hips, palate, and eyes for red reflex<br>Perform a developmental assessment<br>Use WHO or Country specific growth charts to determine:<br>Appropriate-for-gestational-age (AGA: Bwt between 10th and 90th percentile)<br>Large-for-gestational-age (LGA: Bwt > 90th percentile)<br>Small-for-gestational-age (SGA: Bwt < 10th percentile) |
| Management | Know that a newborn infant is prone to heat loss because of a high surface area-to-body mass ratio<br>Know that a newborn infant who is cold stressed rapidly depletes essential stores of fat and glycogen<br>Know that heat loss in the delivery room can be reduced by the use of a radiant warmer, drying the baby thoroughly, swaddling, and skin to skin care with the mother<br>Understand the hazards and benefits associated with the use of radiant warmers for neonates |
| Routine care | |
| History | Understand that maternal exposure to drugs affecting coagulation may result in early hemorrhagic disease of the newborn<br>Understand the importance of breastfeeding and be able to communicate this to the mother<br>Know the causes of feeding problems<br>Know that the caloric requirement per kilogram for adequate growth is greater for preterm infants than for full-term |

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| | infants<br>Understand the principles of parenteral nutrition<br>Understand the importance of nutrition in sick babies<br>Understand that preterm infants have a greater daily fluid requirement per kilogram of body weight than full-term infants<br>Know that insensible water loss is increased with prematurity and the use of radiant warmers<br>Understand that bleeding in a patient with coagulopathy may not be controllable until the coagulopathy is corrected<br>Understand that bleeding in a cogulopathic patient into an enclosed space such as the skull, chest or fascial compartment is an emergency |
| Physical | Be able to:<br>Plan appropriate evaluation of an infant with physiologic breast hypertrophy<br>Utilize growth charts for taking an accurate physical examination (see also ***Growth and Development***) |
| Diagnosis | Be able to:<br>Interpret platelet count, coagulation times, and clotting factor levels to determine the underlying cause in a bleeding coagulopathic patient |
| Management | Know the recommended methods of umbilical cord care<br>Understand that silver nitrate solution is not adequate prophylaxis for neonatal chlamydia conjunctivitis<br>Be able to:<br>Prescribe appropriate fluid requirements for pre-term, sick and growth-restricted babies.<br>Correct fluid balance abnormalities<br>Insert peripheral intravenous lines and percutaneous long lines as appropriate<br>Assess appropriate position of percutaneous long line from diagnostic imaging studies<br>Prescribe appropriate nutrition supplements |

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| | Identify and begin to address suboptimal growth<br>Support and advise breastfeeding mothers<br>Identify causes of feeding problems associated with faltering growth<br>Make appropriate recommendations to address feeding problems and faltering growth (eg, failure to thrive)<br>Provide prophylaxis of ocular gonorrheal infection in a newborn infant including silver nitrate solution in single-dose ampoules or single-use tubes of ophthalmic ointment containing erythromycin or tetracycline<br>Provide prophylactic administration of vitamin K to prevent classic hemorrhagic disease of the newborn when necessary<br>Identify the presenting signs and symptoms of classic hemorrhagic disease of the newborn |
| General Screening | |
| History | Know the normal range of the hematocrit value for a newborn infant<br>Understand that preterm infants have lower hematocrit values than full-term infants |
| Physical | Understand the use of oto-acoustic emission (OAE) devices for neonatal hearing screening<br>Know about the universal newborn hearing screening program<br>Be able to:<br>Recognize the presenting signs and symptoms of congenital syphilis |
| Diagnosis | Know the difference between a screening and a diagnostic test<br>Be able to:<br>Order screening tests appropriately<br>Perform clinical screening tests<br>Explain the difference between a screening test and a diagnostic test to parents<br>Interpret blood glucose estimations<br>Recognize that the rapid assessment of whole blood glucose concentrations (eg, glucose oxidase test strips) |

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| | may yield falsely high or low values<br>Initiate appropriate management for hypoglycemia (ie, blood glucose < 2.6mmol/L)<br>Distinguish between the timing of physiologic anemia of the full-term infant and that of the preterm infant |
| Expanded metabolic screening | |
| Thyroid function (see also ***Endocrinology***) | |
| Diagnosis | Know the possible causes of a decreased serum thyroxine concentration in a neonate<br>Be able to:<br>Distinguish between the possible causes of a decreased serum thyroxine concentration in a term and preterm neonate with or without illness |
| Phenylketonuria (PKU) (see also ***Metabolism***) | |
| Diagnosis | Know the utility and limitations of PKU screening |
| Physiologic events | |
| History | Know that the delayed ( > 48 hours in term infant and > 72 hours in preterm infant) or absent passage of meconium is associated with colonic obstruction (eg, meconium plug syndrome, Hirschsprung disease, imperforate anus)<br>Know the difference between bottle-fed infants and breast-fed infants as related to stool frequency and frequency of feeding<br>Know that blood pressure values vary directly with gestational age |
| Diagnosis | Understand the causes and effects of hypotension<br>Know that bilious vomiting is a common finding in infants with small bowel obstruction |
| Management | Know that a newborn infant who does not urinate by 24 hours of age warrants evaluation<br>Understand the rationale for different treatment options for hypotension<br>Be able to:<br>Plan the evaluation of an anuric infant |

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| | Interpret and act on blood pressure measurements |
| Neonatal jaundice | |
| History | Know the incidence of hyperbilirubinemia in the neonatal period<br>Understand the pathophysiology of hyperbilirubinemia and kernicterus, including bilirubin synthesis, transport, and metabolism<br>Be able to:<br>Obtain history from mother, including ABO, Rh, similar conditions, perinatal history, hemolytic anemia, drug intake, anesthesia<br>Recognize risk factors for the development of different types of hyperbilirubinemia |
| Physical | Be able to:<br>Recognize the early clinical signs of hyperbilirubinemia<br>Distinguish between physiologic jaundice in a full-term infant and physiologic jaundice in a preterm infant<br>Differentiate between physiological and pathological hyperbilirubinemia<br>Recognize the clinical manifestations of acute bilirubin encephalopathy<br>Recognize the permanent clinical sequelae of bilirubin toxicity (kernicterus) |
| Diagnosis | Be able to:<br>Perform and interpret non-invasive techniques for transcutaneous measurement of bilirubin(TcB)<br>Formulate the differential diagnoses of hyperbilirubinemia in neonates<br>Use appropriate investigations that will help diagnose causes of conjugated and unconjugated hyperbilirubinaemia<br>Identify the potential preventable causes of kernicterus<br>Identify features which suggest serious pathology |
| Management | Know the indication and the limitation of prescribing intravenous immunoglobulin and metalloporphyrins |

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| | Be able to:<br>Appropriately investigate a jaundiced baby<br>Manage a jaundiced baby<br>Use specific bilirubin monogram to plan management<br>Plan a therapeutic regime with the goal of preventing indirect (unconjugated) bilirubin induced neurotoxicity<br>Implement the strategies for prevention of severe hyperbilirubinemia in newborn infants (eg, increasing frequency of breast-feeding, increased fluid intake, screening prior to hospital discharge)<br>Use phototherapy appropriately according to age, size, pathologic condition, and level of the bilirubin<br>Anticipate the need for an exchange transfusion appropriately<br>Perform exchange transfusion when indicated<br>Illustrate the complications and side effects of various modalities of management<br>Design a plan for investigation and management of prolonged neonatal jaundice |
| Aspects of drug therapy unique to the newborn | |
| Management | Know that the fetus is a passive recipient of drugs taken by the mother during pregnancy<br>Know that drug entry in addition to enteral and parenteral routes includes transplacental, pulmonary, via skin, conjunctiva or ingestion of breast milk<br>Know the pharmacologic interrelationships of absorption, distribution, biotransformation, and excretion of common drugs used in newborns<br>Know that neonatal renal function influences renal excretion of drugs<br>Know that drug metabolism and disposition in the neonate is affected by:<br>Phase I (oxidation, reduction or hydrolysis; mediated primarily by cytochrome P-450 enzymes) and Phase II (conjugation with endogenous substrates [eg, glucuronic acid, acetate, sulphate]) reactions<br>Deficiency of several enzymes responsible for Phase I and II reactions is present at birth<br>Be able to: |

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| | Adjust doses (smaller with longer time intervals ) taking into account that the rate of drug metabolism and drug clearance is slower in newborns; thus, doses required are<br>Adjust drug 2 -3 weeks after birth as enzymes responsible for metabolism develop over the first month of life<br>Perform therapeutic monitoring of certain drugs as individual development of drug-metabolizing enzymes varies |
| Discharge plans (including nutritional counseling) | |
| Management | Be able to:<br>Determine criteria for consideration of early discharge of a newborn infant , and discharge the baby<br>Discuss the benefits and complications of early discharge of a newborn infant<br>Follow-up after early discharge of a newborn infant |
| Home and out-of-hospital birth | |
| Management | Know practices and care guidelines in your country of domicile |
| Identification of danger signs in the newborn | |
| History | Understand the unwell baby after immediate resuscitation at birth and who might not be feeding<br>Be able to:<br>Identify risk factors for infection |
| Physical | Be able to:<br>Assess breathing and respiratory status:<br>- Apneas, gasping, shallow breathing<br>- Laboured breathing<br>- Use of accessory muscles of respiration<br>- Respiratory distress with RR > 60/min<br>- Dusky (central cyanosis) |

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| | Assess heart rate and cardiovascular system:<br>- HR <100/min or > 220/min<br>- Pale, mottled<br>- Low volume pulses, low blood pressure<br>- Central cyanosis (not improving with supplemental oxygen)<br>Assess temperature Instability:<br>- T < 36°C or > 37.5°C<br>Assess fluid and electrolytes for metabolic acidosis and hyponatremia<br>Assess low blood glucose:<br>- Blood glucose < 2.6mmoL/L<br>- Risk factors for hypoglycemia (e.g., IDM infant; IUGR)<br>Assess neurologic status:<br>- Irritable/jittery<br>- Seizures<br>- Floppy<br>- Lethargic<br>- Does not arouse appropriately<br>Assess surgical conditions:<br>- Frothing at mouth, unable to pass NG tube<br>- Delayed passage of meconium (>48 hours in term baby; > 72 hours in preterm baby)<br>- Imperforate anus<br>- Abdominal distention |

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| | - Bilious vomiting<br>- Gastroschisis/omphalocele<br>- Blood in stools |
| Newborn immunizations/infection prevention and control (see also ***Preventive Pediatrics***) | |
| Management | Please refer to country specific newborn immunization guidelines, infection prevention, and control practices |
| Determinants of neonatal mortality (local and global) | |
| History | Be able to:<br>Identify factors affecting outcomes and manage appropriately:<br>- Premature birth<br>- Low Birth weight/intra-uterine growth retardation<br>- Congenital malformations<br>- Genetic and chromosomal anomalies<br>- Severe periventricular hemorrhage ( Grade III, IV)<br>- Periventricular leucomalacia<br>- Cortical white matter injury<br>- Neonatal Hypoxic Ischemic Encephalopathy Stage II or higher<br>- Chronic lung disease<br>- Congenital and neonatal infections including meningitis<br>- Microcephaly<br>- Nutrition<br>- Social determinants of health |

# *Nephrology*

| **General**<br>By the end of training, the resident should: | |
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| History | Understand normal kidney structure, function, physiology, and development<br>Know age-related changes in glomerular filtration rate and the impact on the serum creatinine concentration<br>Understand the limitations of 24-hour urine collections in pediatric patients<br>Know the requirements for normal fluid, intake, and urine output<br>Understand the role of the kidney in systemic disease<br>Understand the importance of family history for hereditary kidney diseases<br>Understand the impact of kidney function on growth, bone metabolism, and hemoglobin levels |
| Physical | Be able to:<br>Conduct a full examination of normal physical status including hydration status, somatic growth parameters, and blood pressure |
| Diagnosis | Know the indications for non-renal investigations such as echocardiography, chest x-ray, ophthalmology and hearing tests<br>Understand the principles and use of modern imaging modalities and how to minimize radiation<br>Know the special value of ultrasonography and its limitations<br>Be able to:<br>Diagnose dysmorphic features associated with renal diseases<br>Interpret urinanalysis (eg, proteinuria, hematuria, leucocyturia, casts)<br>Interpret microbiology findings in the urine<br>Interpret acid base status in the context of renal diseases<br>Interpret electrolytes and glucose excretion in the urine<br>Interpret blood pressure in different age groups<br>Use functional tests to assess kidney function |
| Management | Understand and apply principles of fluid management |

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| | Understand the indications and use of diuretic drugs<br>Know major indications for kidney biopsy<br>Know antibiotic treatment and route of drug elimination<br>Know how to adapt drug therapy according to renal function (GFR)<br>Be able to:<br>Initiate treatment for high blood pressure<br>Anticipate consequences of acute renal failure and initiate early transfer to specialized centers offering renal replacement therapy |

| **Presenting signs and symptoms**<br>By the end of training, the resident should: | |
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| Proteinuria | |
| History | Know the causes of proteinuria<br>Know that proteinuria may be associated with systemic diseases<br>Be able to:<br>Recognize the age manifestations of nephrotic syndrome<br>Identify congenital and familiar manifestations<br>Detect early clinical symptoms of edema manifestation<br>Ascertain exercise induced proteinuria in context of febrile illness |
| Physical | Be able to:<br>Examine for edema, ascites, and pleural effusion<br>Recognize systemic diseases (eg, skin alterations, vasculitis, arthritis) |
| Diagnosis | Know sampling errors and false positive results (ie, dipstick examination of an alkaline urine)<br>Be able to:<br>Differentiate between nephritis and nephrotic syndrome |

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| | Perform the appropriate evaluation of a child with proteinuria<br>Measure and classify proteinuria<br>Apply biochemical and immunological parameters to make differential diagnosis<br>Recognize and diagnose complications of nephrotic syndrome |
| Management | Know the indication for treatment with glucocorticosteroids<br>Know the major indications for immunosuppressive therapy<br>Know indications for biopsy and when to refer to a specialist<br>Be able to:<br>Manage fluid intake and the adequate use of diuretics<br>Advise parents regarding long term issues |
| Hematuria | |
| History | Know the causes of gross and microscopic hematuria<br>Know the non-hematogenous etiology of red urine<br>Understand the importance of the family history in a child with persistent microscopic hematuria<br>Know that hematuria can be a symptom of systemic diseases<br>Understand the causes of intermittent hematuria |
| Physical | Be able to:<br>Recognize external cause of hematuria (eg, preputial lesions, child abuse)<br>Recognize edema and signs for systemic disease and vasculitis |
| Diagnosis | Know the association between hypercalciuria and microscopic hematuria, and evaluate appropriately<br>Know that myoglobin can yield false-positive results for hematuria on urinalysis<br>Be able to:<br>Identify persistent microscopic hematuria<br>Interpret urinalysis and measure proteinuria, biochemistry, and immunological parameters |

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| | Formulate the differential diagnosis of a child with gross hematuria<br>Rule out structural abnormalities in patients with gross hematuria<br>Utilize ultrasound results for forming a differential diagnosis |
| Management | Be able to:<br>Refer to specialist for further evaluation when appropriate<br>Plan the evaluation of hematuria in a child with sickle cell trait or disease |
| Acute renal failure | |
| History | Know the common causes of pre-renal, intrinsic, and post-renal failure<br>Know common clinical conditions preceding acute renal failure |
| Physical | Be familiar with incipient and clinical overt pulmonary edema<br>Be able to:<br>Recognize fluid overload as well as dehydration associated with acute renal failure |
| Diagnosis | Be able to:<br>Diagnose acute renal failure (ie, oliguric and polyuric)<br>Diagnose critical conditions such as electrolyte disturbances, hyperkalemia, hyperphosphatemia, and acid base disturbances<br>Employ proper imaging modalities for causes and sequelae of ARF (eg, pathology of the kidney or fluid overload) |
| Management | Know the drug dosage modifications in acute renal failure<br>Know the importance of nutrition in a child with acute renal failure<br>Be able to:<br>Plan for fluid balancing and the appropriate use of diuretics<br>Initiate treatment of life threatening situations such as hyperkalemia<br>Organize the timely transfer of patients to dialysis centers |
| Polyuria (see ***Endocrinology***) | |
| Arterial hypertension (see also ***Cardiology***) | |

## *Nephrology*

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| History | Know the common causes of cardiovascular, endocrine, and renal arterial hypertension<br>Know the importance of family history with regard to hypertension<br>Be able to:<br>Recognize the non-specific symptoms of hypertension |
| Physical | Be able to:<br>Detect the cardiovascular causes of arterial hypertension<br>Measure blood pressure in all age groups |
| Diagnosis | Be able to:<br>Diagnose the likelihood of renal cause for arterial hypertension<br>Diagnose major renal structural abnormalities<br>Interpret renin/aldosteron levels<br>Diagnose end organ damage (eg, cardiac hypertrophy/pathologic funduscopy) |
| Management | Be able to:<br>Lower blood pressure in emergency situations<br>Consult with specialists regarding initial and long term therapy<br>Counsel parents/caregivers and patients about the consequences and importance of long term blood pressure control |
| Dysuria | |
| History | Know that the etiology of dysuria may be age-related and that numerous other etiologies include vaginitis, chemical irritation, urinary tract infection, and trauma<br>Understand the importance of sexual activity when considering the differential diagnosis of abdominal pain and dysuria |
| Physical | Be able to:<br>Perform perineal inspection in girls with dysuria |
| Diagnosis | Be able to:<br>Obtain urine culture (ie, clean catch or catherization) |

## *Nephrology*

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| Management | Be able to:<br>Initiate adequate therapy and counseling |
| Voiding problems | |
| History | Know the variations in becoming continent<br>Understand the physiology and pattern of normal voiding and bladder capacity<br>Understand the typical uneventful history in cases with primary nocturnal enuresis<br>Know diseases causing abnormal voiding<br>Understand that some children with enuresis may have a functionally reduced bladder capacity and/or frequent uninhibited bladder contractions<br>Be able to:<br>Complete a detailed voiding history |
| Physical | Be able to:<br>Conduct genital inspection and neurological assessment |
| Diagnosis | Be able to:<br>Interpret voiding pattern/uroflow<br>Refer for more detailed bladder studies and urodynamic assessment when necessary<br>Interpret bladder and urinary tract by results of ultrasound<br>Diagnose caudal nerve pathology |
| Management | Be able to:<br>Counsel parents and children appropriately regarding voiding problems<br>Refer to pediatric nephrologist/urologist with experience in urotherapy and bladder training |

| **Congenital nephrologic disorders**<br>By the end of training, the resident should: |
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| Renal dysplasia |

## *Nephrology*

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| History | Know that dysplasia encompasses a broad spectrum of disease<br>Know that some dysplasias are hereditary and may have identified genetic mutations |
| Physical | Be able to:<br>Assess hydrations status and presence of any dysmorphic features<br>Recognize the association of bilateral renal aplasia or severe dysplasia with pulmonary hypoplasia (ie, Potter sequence) |
| Diagnosis | Be able to:<br>Utilize ultrasound results to form a differential diagnosis<br>Diagnose associated urinary tract anomalies<br>Assess renal function<br>Interpret electrolyte disturbances in this context |
| Management | Be able to:<br>Develop a plan for fluid and electrolyte balancing<br>Collaborate with specialists for treatment<br>Initiate counseling of parents |
| Unilateral multi-cystic dysplastic kidney (MCD) | |
| History | Know that common MCD may be diagnosed *in utero* by ultrasound |
| Physical | Know that multi-cystic dysplastic kidney frequently presents as a unilateral flank mass in neonates/infants<br>Be able to:<br>Elicit a palpable multi-cystic dysplastic kidney |
| Diagnosis | Know that intensified imaging (ie, micturating cysto uretherogram (MCU)) may be indicated if contra-lateral kidney appears abnormal<br>Be able to:<br>Diagnose MCD by results of ultrasound<br>Differentiate from hydronephrosis |

## *Nephrology*

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| Management | Be able to:<br>Recognize that almost most cases need no intervention<br>Provide adequate counseling to parents |
| Structural abnormalities | |
| History | Know that hydronephrosis is one of the causes of abdominal masses in infants<br>Know that hydroureter and megaureter are urologic findings associated with prune-belly (Eagle-Barrett) syndrome<br>Know that a ureterocele may lead to urinary tract obstruction<br>Know the natural history of vesicoureteral reflux (eg, etiology, familial association, outcome)<br>Be aware of an increased risk of urinary tract infections in the presence of obstruction |
| Physical | Be able to:<br>Detect hydronephrosis when associated with abdominal mass<br>Evaluate urinary stream |
| Diagnosis | Know that functional relevance of suspected obstruction on ultrasound must be assessed by dynamic radiology (eg, scintgraphic techniques)<br>Be able to:<br>Formulate a differential diagnosis for urinary tract obstruction<br>Diagnose structural abnormalities by results of ultrasound and/or MCU |
| Management | Be able to:<br>Initiate management by interdisciplinary approach with nephrologist and pediatric surgeons or pediatric urologists<br>Initiate antibiotic therapy for associated infections<br>Plan the evaluation of an infant presenting with anuria more than 48 hours after birth |
| Abnormalities of the urethra | |
| Posterior urethral valves | |
| History | Know that a weak urinary stream in a newborn or infant boy is suggestive of posterior urethral valves |
| Physical | Be able to: |

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| | Recognize a palpable or distended bladder and a weak urinary stream |
| Diagnosis | Know that renal failure may occur in boys with posterior urethral valves despite repair of the valves<br>Be able to:<br>Formulate diagnosis by means of MCU followed by cystoscopy |
| Management | Know that bladder dysfunction and incontinence are sequelae with long lasting consequences which need specialized care<br>Be able to:<br>Consult with nephrologists and urologists about management<br>Provide timely therapy and follow-up for urethral valves<br>Plan the long-term evaluation of renal and bladder function in patients with posterior urethral valves |
| Urethral stricture | |
| History | Know that urethral strictures in boys almost always result from urethral trauma (ie, iatrogenic or accidental)<br>Know that a girl with a narrow urethra needs no treatment |
| Physical | Be able to:<br>Assess urinary stream |
| Diagnosis | Be able to:<br>Interpret the report of bladder wall thickness and residual urine by ultrasound |
| Management | Be able to:<br>Refer to pediatric urologist |
| Hereditary nephropathy | |
| Autosomal-recessive polycystic kidney disease (ARPKD) | |
| History | Know the organ involvement in ARPKD and difference from ADPKD<br>Understand the importance of liver fibrosis with ARPKD<br>Know short-, mid-, and long-term prognosis |
| Physical | Be able to: |

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| | Detect bilateral kidney enlargement<br>Identify arterial hypertension by measuring blood pressure<br>Recognize the neonate with pulmonary hyposplasia |
| Diagnosis | Be able to:<br>Identify the ultrasound characteristics in ARPKD<br>Identify potential signs for portal hypertension |
| Management | Be able to:<br>Plan potential treatment options depending on severity of organ involvement in consultation with pediatric nephrologist |
| Autosomal-dominant polycystic kidney disease (ADPKD) | |
| History | Know that children with autosomal-dominant polycystic kidney disease usually presented later in life than those with ARPKD<br>Know the importance of family history for the autosomal inheritance<br>Know that autosomal-dominant polycystic kidney disease may be associated with intracranial aneurysms |
| Physical | Understand that physical examination in most cases reveals no pathology during childhood |
| Diagnosis | Understand that abdominal ultrasonography is the preferred diagnostic procedure in children suspected of having autosomal-dominant polycystic kidney disease<br>Know when to submit patient to genetic testing |
| Management | Know that most cases with normal renal function need no treatment irrespective of cyst size |

| **Acquired nephrologic disorders**<br>By the end of training, the resident should: | |
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| Infection of the urinary tract | |
| Pyelonephritis and cystitis | |
| History | Know the predominant organisms causing urinary tract infection in children<br>Understand that children with reflux nephropathy are often asymptomatic<br>Know the epidemiology of urinary tract infection (ie, age of onset, gender) |

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| | Know that structural and functional anomalies of the urinary tract predispose to recurrent infection<br>Know that secondary enuresis may be a sign of cystitis |
| Physical | Understand the association of urinary tract infection and unexplained fever in infants |
| Diagnosis | Know that urinalysis alone is insufficient to diagnose a urinary tract infection<br>Be able to:<br>Differentiate cystitis from pyelonephritis<br>Perform urinanalysis<br>Implement antibiotic sensitivity testing in the treatment of acute pyelonephritis |
| Management | Understand importance of sexual activity history in a patient who has cystitis<br>Be able to:<br>Prescribe the appropriate initial antimicrobial drugs for acute pyelonephritis before urine culture results are available<br>Plan for the long-term antibiotic prophylaxis against urinary tract infection<br>Manage the association between urinary tract infection and constipation<br>Initiate treatment in case of voiding disorders<br>Plan the appropriate antibiotic treatment for and follow-up management of acute cystitis<br>Plan the treatment for cystitis in a sexually active patient<br>Plan the management of recurrent cystitis |
| Acute glomerulonephritis | |
| History | Know the commonest forms of acute glomerulonephritis (eg, idiopathic, postinfectoius, and in systemic disease)<br>Know the common preceding infections in post streptococci glomerulonephritis (eg, pharyngitis, skin infections,) |
| Physical | Be able to:<br>Recognize immediate complications of post-streptococcal nephritis (eg, hypertension, fluid overload)<br>Recognize systemic disease with kidney involvement (eg, skin lesions, arthritis, pulmonary symptoms) |
| Diagnosis | Be able to: |

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| | Interpret the laboratory evaluation of acute post-streptococcal nephritis<br>Differentiate acute post-streptococcal glomerulonephritis from other forms of glomerulonephritis |
| Management | Understand that acute post-streptococcal nephritis rarely progresses to chronic renal failure<br>Know the time sequence of resolution of hypocomplementemia, hematuria, and proteinuria in post-streptococcal glomerulonephritis<br>Be able to:<br>Plan the initial management of acute post-streptococcal glomerulonephritis<br>Consult with specialists regarding more complex glomerulonephritis |
| Nephrotic syndrome | |
| History | Know the definition of nephrotic syndrome<br>Know the different underlying diseases leading to nephrotic syndrome in specific areas of the world<br>Know the difference between steroid responsive and steroid resistant nephrotic syndrome<br>Know that congenital and steroid resistant nephrotic syndrome may have increasing numbers which are defined by genetic mutations<br>Understand that minimal-change nephrotic syndrome is a relapsing disease<br>Understand the etiology of hyponatremia in nephrotic syndrome |
| Physical | Be able to:<br>Recognize edema, ascites, and other possible complications<br>Recognize the complications of nephrotic syndrome (eg, peritonitis, thromboses) |
| Diagnosis | Understand the prognostic significance of a decreased serum C3 concentration in a patient with nephrotic syndrome (ie, it is an indicator of a diagnosis other than minimal-change disease)<br>Be able to:<br>Interpret the laboratory findings with minimal-change nephrotic syndrome<br>Formulate the differential diagnosis of nephrotic syndrome with and without hematuria |
| Management | Be able to: |

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| | Monitor the response to glucocorticosteroid therapy as this is one of the best indicators of the prognosis in nephrotic syndrome<br>Plan the initial treatment for a child with an initial episode of nephrotic syndrome<br>Manage the complications of diuretic therapy in a child with nephrotic syndrome<br>Provide for symptomatic treatment as indicated<br>Consult with specialists regarding long term management or atypical nephritic syndrome |
| Hemolytic-uremic syndrome | |
| History | Know that HUS is the most common cause of acute renal failure in children<br>Understand the association between enterohemorrhagic E. coli O157:H7 and hemolytic-uremic syndrome<br>Know the symptoms and diarrheal prodrome of hemolytic uremic syndrome<br>Know that a subgroup of atypical HUS has a poor prognosis with regard to renal recovery |
| Physical | Be able to:<br>Recognize the signs and the diarrheal prodrome of hemolytic-uremic syndrome<br>Recognize clinical status and possible complication of acute renal failure<br>Identify degree of anemia by clinical means |
| Diagnosis | Be able to:<br>Interpret the diagnostic laboratory findings in children with hemolytic-uremic syndrome (eg, thrombocytopenia, microangiopathic hemolytic anemia, uremia)<br>Diagnose secondary consequences of acute renal failure |
| Management | Be able to:<br>Plan the appropriate initial management of a child with hemolytic-uremic syndrome<br>Understand the risk of antibiotic therapy in a patient who has an enterohemorrhagic E. coli O157:H7 urinary tract infection<br>Plan early referral for dialysis |
| Henoch-Schoenlein purpura | |

## *Nephrology*

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| History | Know the different degrees of renal involvement |
| Physical | Be able to:<br>Recognize the signs and symptoms of HSP vasulitis (eg, petechiae, abdominal pain, periarticular edema, hematuria)<br>Identify the typical distribution of petechiae<br>Recognize abdominal involvement |
| Diagnosis | Be able to:<br>Diagnose HSP, ruling out thrombocytopenia and coagulopathy<br>Identify the renal manifestations of HSP<br>Measure kidney involvement by urinalysis and measuring proteinuria, GFR, and serum protein |
| Management | Know that nephrotic syndrome in association with HSP is a sign for poor prognosis<br>Understand that Henoch-Schoenlein nephritis rarely progresses to chronic renal failure<br>Be able to:<br>Plan the conservative management of HSP<br>Determine pharmacological treatment by severity of kidney involvement<br>Plan for renal biopsy (eg, heavy or persistent proteinuria) as needed |
| IgA nephropathy | |
| History | Know that IgA nephropathy is one of the most common glomerular diseases<br>Know that IgA nephropathy presents mostly by intermittent hematuria with preceding respiratory tract infection<br>Know that persistent proteinuria worsens the prognosis |
| Physical | Be able to:<br>Recognize the signs and symptoms of IgA nephropathy are unspecific |
| Diagnosis | Know that there are no specific laboratory markers for IaA<br>Be able to:<br>Order biopsy to formulate precise diagnosis |

## *Nephrology*

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| Management | Be able to:<br>Involve specialist consultation as part of the therapy plan |
| Acute non-traumatic renal injuries | |
| History | Know common cause of toxic acute kidney injuries<br>Know drugs that are nephrotoxic |
| Physical | Know that physical examination rarely helps to specify the problem<br>Be able to:<br>Recognize the immediate complications (eg, hypertension, fluid overload) |
| Diagnosis | Be able to:<br>Identify laboratory toxicology<br>Interpret laboratory measurement of drug levels<br>Measure kidney function and related parameters |
| Management | Be able to:<br>Plan therapy according to underlying poison or toxic medication<br>Find comprehensive information (eg, toxicology services, internet, special textbooks) to plan management |
| Disorders secondary to metabolic diseases and other systemic disorders | |
| History | Know metabolic disease with kidney involvement such as diabetes, Wilson´s disease, oxalosis, and cystinosis<br>Know systemic diseases with kidney involvement such as Lupus Erythematosis, leukemia, and amyloidosis |
| Physical | Be able to:<br>Recognize immediate complications (eg, hypertension, fluid overload) |
| Diagnosis | Be able to:<br>Assess renal involvement and renal function when necessary |
| Management | Be able to:<br>Treat according to underlying disease, impaired renal function, and related complications |

| **Other renal conditions**<br>By the end of training, the resident should: | |
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| Chronic kidney disease (chronic renal failure) | |
| History | Know common causes of chronic renal failure (ie, congenital and acquired)<br>Know the major complications of chronic renal failure<br>Know that growth failure is common in children with chronic kidney disease<br>Know that acidosis contributes to growth failure in chronic kidney disease<br>Understand alterations in calcium, phosphorus, and vitamin D-metabolism<br>Be able to:<br>Recognize the symptoms of chronic renal failure |
| Physical | Be able to:<br>Recognize the signs of chronic renal failure, especially growth retardation, anemia, renal osteopathy, poor nutritional status, and arterial hypertension |
| Diagnosis | Be able to:<br>Identify parameters of poor renal function in chronic renal failure, low GFR, uremia, electrolyte disturbances and disturbances in calcium phosphate metabolism, and secondary hyperparathyroidism |
| Management | Understand and manage the major complications of chronic kidney disease<br>Be able to:<br>Manage volume and salt depletion if it develops in an infant with renal dysplasia or hydronephrosis<br>Initiate growth hormone therapy in growth failure as appropriate<br>Treat renal anemia with EPO when necessary |
| End-stage kidney disease and renal replacement by transplantaion | |
| History | Know major reasons for end-stage renal disease requiring kidney transplantation<br>Know drugs used for Immunosuppression in renal transplant recipients<br>Know about living related and deseased donor organ transplantation |

## *Nephrology*

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| Physical | Be able to:<br>Identify a transplanted kidney by palpation<br>Measure blood pressure and volume status<br>Identify visible side effects of immunosppressive drugs |
| Diagnosis | Be able to:<br>Measure kidney function and related parameter, immunosuppression drug levels, urinalysis |
| Management | Know basis of immunosuppressive drugs employed after renal transplantation and the need for pharmacokinetic monitoring<br>Be able to:<br>Identify the possibility of renal transplantation (ie, living related or deseased donors) and the impact on prognosis<br>Provide immunizations to patients prior to renal transplantation as early as possible<br>Work collaboratively with a wide range of specialists to support the child and family |
| Urinary tract stones | |
| History | Know the role of chronic infection and urine stasis in the formation of urinary tract stones<br>Understand importance of positive family history for urinary tract stones |
| Physical | Be able to:<br>Identify signs of urinary stones |
| Diagnosis | Know the association between hypercalciuria and the formation of urinary tract stones<br>Be able to:<br>Collect renal stones for diagnostic assessment if possible<br>Initiate investigation of biochemical parameters associated with stone formation |
| Management | Know the association of nephrocalcinosis and furosemide therapy in neonates<br>Know the difference in calcium excretion resulting from thiazide vs loop diuretic therapy<br>Be able to:<br>Consider increasing fluid intake in children with urinary tract stones |

## *Nephrology*

| Renal tubular disorders | |
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| History | Know major renal tubular disorders and symptoms of renal tubular disorders<br>Know that rickets may be a symptom associated with tubular disorders |
| Physical | Know that growth failure is a common presentation of renal tubular acidosis<br>Know that growth failure can be a consequence of tubular disorders |
| Diagnosis | Understand the principals in measuring tubular dysfunction through fractional excretion |
| Management | Know the principles of substitution therapy |

## *Neurology*

| **General (including altered level of consciousness)**<br>By the end of training, the resident should: | |
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| History | Have knowledge and understanding of the pathophysiology of common disorders affecting the nervous system<br>Know and understand the common causes of disability<br>Understand the implications of acute focal neurological signs<br>Know the common causes of an altered level of consciousness<br>Know which ingestions and intoxications are likely to result in neurologic toxicity<br>Know which historical and physical findings should lead to consideration of child abuse as a cause of an altered level of consciousness<br>Understand the implications for families of children with neurologic and neuro-disabling conditions<br>Be able to:<br>Take an accurate neurologic and neuro-developmental history<br>Identify the impact of developmental disorders on the life of child and family at different developmental stages |
| Physical | Be able to:<br>Examine the nervous system of a newborn baby, child, and adolescent<br>Perform a reliable assessment of neurodevelopmental status at key stages, including the newborn period, the first year of life, nursery age, school entry, and late primary education<br>Identify a neuro-disabled child<br>Interpret abnormal neurological signs |
| Diagnosis | Know the uses and limitations of neuro-radiologic techniques such as magnetic resonance imaging, computed tomography, and ultrasonography<br>Have a basic understanding and know the uses and limitations of neurophysiologic tests such as evoked potentials, electromyography, and electroencephalography |

## *Neurology*

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| | Be able to:<br>Make appropriate use of neuroradiologic imaging and neurophysiologic tests<br>Distinguish simple developmental delay from developmental disorders<br>Identify and come to a likely diagnosis of common developmental disorders such as cerebral palsy, dyspraxia, ADHD, and specific learning difficulties<br>Measure ammonia and organic acid concentrations in neonatal coma<br>Plan the initial phase of evaluation for an altered level of consciousness<br>Identify that disorders of metabolism, liver, kidneys, lungs and heart can manifest as encephalopathy |
| Management | Be able to:<br>Initiate management of children with neurologic and neuro-disabling conditions<br>Manage simple cases of developmental disorders<br>Obtain prompt specialist help in the face of life-threatening acute neurologic deterioration<br>Refer to specialists for equipment that can be used to lessen the effects of disability<br>Locate self-help and support groups and refer parents and children to them<br>Work with families and professionals in the care of disabled children<br>Demonstrate a commitment to advocacy on behalf of disabled children and their families<br>Consult effectively with specialists arranging timely and appropriate referrals<br>Explain diagnosis and prognosis to parents |

| **Signs and symptoms of neurologic dysfunction**<br>By the end of training, the resident should: | |
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| Seizures (neonatal; febrile; infantile spasms; absence [Petit mal]; complex partial; status epilepticus; epilepsy syndrome) | |
| History | Know the common causes of seizures in newborn babies and children<br>Know about common epileptic syndromes |

## *Neurology*

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| | Understand the links between epilepsy and behavior problems<br>Understand the metabolic causes of seizures<br>Know which drugs may precipitate or exacerbate seizures<br>Know the etiologic implications of partial versus generalized seizures<br>Know the effects of epilepsy and anticonvulsant therapy on reproductive health (eg, contraception) and the fetus<br>Understand the natural history of febrile seizures<br>Know the possible etiologies of status epilepticus (eg, infection, toxin, electrolyte imbalance, drug withdrawal)<br>Understand the psychosocial effects of epilepsy<br>Know that non-epileptic events do not rule out epilepsy<br>Be able to:<br>Distinguish between epileptic seizures and paroxysmal non-epileptic events (eg, breath-holding, tics, self-stimulation, syncope, gastroesophageal reflux, pseudoseizures, sleep disturbances)<br>Identify the factors associated with an increased risk of seizure disorder |
| Physical | Be able to identify the clinical manifestations of:<br>Generalized motor seizures<br>Juvenile myoclonic epilepsy<br>Absence epilepsy (Petit mal)<br>Complex partial epilepsy<br>Neonatal seizures<br>Infantile spasms<br>Rolandic epilepsy |
| Diagnosis | Understand the place and principles of the EEG and neuroimaging in investigation<br>Be able to: |

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| | Form a differential diagnosis based upon a thorough history and physical examination<br>Utilize the diagnostic criteria for making a diagnosis of febrile seizure |
| Management | Understand the principles of initial and continuing anticonvulsant therapy in babies and children<br>Know about the long term implications of epilepsy, including different epilepsy syndromes, and the risk of learning difficulties, accident or sudden death<br>Know the relationship between etiology and prognosis in seizures<br>Know the laboratory abnormalities caused by anticonvulsants<br>Know the interactions of anticonvulsants with other drugs<br>Understand the cognitive/behavioral consequences of treatment with anticonvulsants<br>Understand the cognitive/behavioral problems associated with seizure disorders<br>Know the value, limitations, and timing of serum drug concentration determinations during the management of seizures<br>Know the prognosis following neonatal seizures<br>Know the risk factors associated with febrile seizures related to later epilepsy<br>Know the prognosis for children with infantile spasms<br>Know the therapeutic implications of partial versus generalized seizures<br>Understand the drugs used to treat absence epilepsy (Petit mal) and complex partial seizures<br>Know the medications that can be administered rectally to treat status epilepticus<br>Be able to:<br>Initiate treatment for acute continuing seizures<br>Refer to intensive care teams appropriately and maintain patient safety until that team takes over<br>Determine initial and continuing anticonvulsant therapy in babies and children<br>Advise parents about education and safety |

## *Neurology*

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| | Manage a child following a first seizure<br>Manage a child with recurring seizures<br>Formulate a management plan for a patient with psychogenic seizures<br>Provide appropriate counseling regarding activities and behavior of a child with a seizure disorder (eg, athletics, school, driving, medications)<br>Select drug therapies based on seizure type<br>Initiate and discontinue anticonvulsant therapy as indicated<br>Monitor and manage the side effects and toxicities of anticonvulsants<br>Measure serum glucose, electrolyte, calcium, and magnesium concentrations in a patient with status epilepticus<br>Initiate the appropriate treatment of rolandic epilepsy<br>Consult appropriately with specialists about treatment<br>Explain diagnoses to parents |
| Headache (including migraine, increased intracranial pressure, and pseudotumor cerebri) | |
| History | Have knowledge and understanding of the pathophysiology of headaches<br>Know the possible biological, psychological, and social factors that can contribute to headache<br>Know and understand the common causes of headaches<br>Understand the implications of acute focal neurological signs and those that should prompt immediate neuroimaging<br>Know the difference between pediatric migraines and adult migraines<br>Be able to:<br>Take an accurate history (including family history) on headaches<br>Identify the impact of headaches on activity of daily life and quality of life |
| Physical | Be able to: |

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| | Identify signs of increased intracranial pressure such as papilledema |
| Diagnosis | Be able to:<br>Distinguish migraines from headaches secondary to increased intracranial pressure<br>Make appropriate use neuro-radiologic imaging<br>Identify when headache may indicate serious illness and arrange prompt investigations |
| Management | Be able to:<br>Initiate appropriate investigations and treatment for headaches<br>Locate self-help and support groups and refer parents and children to them<br>Initiate management of children with migraines and cluster headaches<br>Consult appropriately with specialists about more complex causes of headaches<br>Arrange timely and appropriate specialist assessment of intracranial space occupying lesions<br>Explain the diagnoses to parents |
| Ataxia | |
| History | Know the common causes of ataxia (eg, post-infectious, genetic, cerebral palsy, and benign paroxysmal vertigo)<br>Be able to:<br>Identify features that suggest ataxia including clumsiness and abnormal movement patterns<br>Identify the impact of ataxia on activity of daily life and quality of life |
| Physical | Be able to:<br>Undertake specific neurologic examination testing for co-ordination<br>Detect the effect of ataxia on gait<br>Identify truncal and limb ataxia<br>Identify other signs of cerebellar dysfunction (eg, nystagmus, abnormal reflexes, and hypotonia)<br>Distinguish between ataxia of acute labyrinthitis and that of neurologic disorders |

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| | Recognize the cutaneous features of hereditary ataxia telangectasia |
| Diagnosis | Understand the implications of acute focal neurologic signs and those that should prompt immediate neuroimaging<br>Know when it is appropriate to organize neuro-radiologic imaging and lumbar puncture<br>Understand the significance of raised alfafetoprotein and reduced immunoglobulin levels in patient with ataxia<br>Know the location of the genetic abnormality in ataxia telangectasia<br>Be able to:<br>Use investigations appropriately to aid diagnosis<br>Form a likely differential diagnosis |
| Management | Be able to:<br>Manage acute post infectious ataxia<br>Consult appropriately with specialists about more complex causes of ataxia<br>Explain the diagnoses to parents |
| Other Involuntary, paroxysmal moving disorders (including chorea, dystonia, myoclonus, tics, tremor) | |
| History | Know the common causes of involuntary movement and movement disorders (eg, infections, metabolic and neurotransmitter imbalance)<br>Be able to:<br>Identify features in the history to distinguish between movement disorders, behavior disorders, and tics<br>Identify the impact of involuntary movements on activity of daily life and quality of life |
| Physical | Know the value of video in assessing a patient with a movement disorder when symptoms are episodic<br>Be able to:<br>Identify involuntary movements accurately |
| Diagnosis | Be able to:<br>Establish a differential diagnosis of movement disorders |

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| | Distinguish between tics and Tourette syndrome |
| Management | Be able to:<br>Manage common, benign and transient movement disorders such as benign myoclonus of infancy and tics<br>Consult with specialists about more complex causes of ataxia<br>Explain the diagnosis/prognosis to parents |
| Weakness and hypotonia | |
| History | Know and understand the common causes of weakness and hypotonia<br>Be able to:<br>Detect features in the history suggestive of weakness<br>Identify impact of weakness and hypotonia on activity of daily life and quality of life |
| Physical | Be able to:<br>Distinguish between weakness due to neuropathy and that due to myopathy<br>Differentiate muscle power strength from muscle tone |
| Diagnosis | Know the uses and limitations of neuro-radiological techniques, neurophysiological tests and muscle biopsy<br>Be able to:<br>Form a likely differential diagnosis |
| Management | Be able to:<br>Manage common causes of weakness and hypotonia<br>Consult with specialists about more complex causes of weakness and hypotonia<br>Explain the diagnosis/prognosis to parents |
| Microcephaly (including craniosynostosis) and Macrocephaly (also see ***Growth and Development***) | |
| History | Know the common causes of hydrocephalus, macrocephaly and microcephaly<br>Be able to: |

## *Neurology*

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| | Identify risk factors in the history for abnormal head growth |
| Physical | Be able to:<br>Measure head circumference accurately<br>Plot and interpret a head growth chart<br>Distinguish between macrocephaly and hydrocephaly<br>Identify normal and abnormal variations in head shape |
| Diagnosis | Know the uses and limitations of neuro-radiological techniques<br>Be able to:<br>Initiate investigations for abnormal head growth and identify which are urgent<br>Formulate a differential diagnosis |
| Management | Be able to:<br>Manage common causes of abnormal head shape<br>Consult with specialists about more complex causes of abnormal head shape<br>Explain diagnosis/prognosis to parents |
| Paralysis (including stroke, spinal cord compression, Guillian Barre Syndrome (GBS), transverse myeltis, poliomyelitis | |
| History | Know the causes of acute paralysis<br>Know conditions associated with spinal cord compression (eg, bony dysplasias or storage disorders)<br>Know that tics may cause paralysis |
| Physical | Be able to:<br>Identify from the examination if the lesion is in the brain, spinal cord, anterior horn cell, peripheral nerve, neuromuscular junction and/or muscle<br>Identify sensory signs and a sensory level when present<br>Identify the difficulties in differentiating between spinal cord compression and GBS |

## *Neurology*

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| Diagnosis | Be able to:<br>Select investigations to distinguish between causes of acute paralysis |
| Management | Be able to:<br>Identify those conditions where specific treatment is available and improves long term outcome (eg, GBS)<br>Consult with specialists including neurologists and neurosurgeons<br>Explain diagnosis and prognosis to the family |

| **Specific diseases**<br>By the end of training, the resident should: | |
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| Meningitis (Bacterial, Viral, Fungal) | |
| History | Know the etiologies of meningitis in neonates, children, and adolescents<br>Know the causes of meningitis when no bacteria are isolated (eg, partially treated, parameningeal focus, Borrelia, spirochete, M. tuberculosis)<br>Know the clinical manifestations of aseptic meningitis<br>Know the prevalence of meningitis in your area<br>Understand the pathogenesis and pathophysiology in acute bacterial meningitis<br>Understand the relationship between meningitis and seizures<br>Be able to:<br>Elicit features in the history that are suggestive of meningitis<br>Elicit features in the history that identify risks factors for meningitis |
| Physical | Be able to:<br>Identify the clinical signs of meningitis including those of complications such as raised intracranial pressure<br>Demonstrate signs of meningism (nuchal rigidity, Kernig's sign, Brudzinski's sign) |
| Diagnosis | Know the antigen detection tests (latex agglutination test, PCR) used for making rapid diagnosis of meningitis |

## *Neurology*

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| | Know the indications for diagnostic imaging in patients with meningitis<br>Be able to:<br>Formulate a differential diagnosis of fever and petechiae/purpura in bacterial meningitis<br>Differentiate between meningitis and other conditions that may mimic it (eg, brain abscess, intracranial hemorrhage, tumor, neurocysticercosis, hydatid cyst)<br>Distinguish among cerebrospinal fluid findings in bacterial, fungal, and viral meningitis<br>Identify the laboratory diagnosis of aseptic meningitis<br>Safely perform an appropriate lumbar puncture<br>Accurately use a validated coma score<br>Know the antigen detection tests (latex agglutination test, PCR) used for making rapid diagnosis of meningitis<br>Interpret, in collaboration with radiological colleagues, abnormalities that may be seen using neuroimaging methods |
| Management | Know the common acute complications of meningitis<br>Be able to:<br>Assess and manage meningitis including appropriate antimicrobial therapy<br>Identify and manage the acute complications of meningitis (eg, raised intra-cranial pressure, subdural effusion, and cerebral edema)<br>Carefully monitor fluid balance and electrolyte concentrations in meningitis<br>Manage the potential long-term sequelae of meningitis<br>Refer to audiology specialists after bacterial meningitis |
| Encephalitis | |
| History | Know the etiologies of encephalitis in children<br>Understand the relationship between encephalitis and seizures<br>Know the clinical manifestations of encephalitis |

## *Neurology*

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| Physical | Be able to:<br>Identify the clinical manifestations of encephalitis<br>Assess mental status |
| Diagnosis | Be able to:<br>Identify the laboratory diagnosis of encephalitis<br>Safely perform a lumbar puncture when necessary<br>Accurately use a validated coma score |
| Management | Be able to:<br>Assess and manage encephalitis including appropriate antimicrobial therapy<br>Identify and manage the acute complications of encephalitis (eg, raised intra-cranial pressure, subdural effusion, cerebral oedema)<br>Carefully monitor fluid balance and electrolyte concentrations in meningitis<br>Manage the potential long-term sequelae of encephalitis<br>Manage seizures associated with encephalitis |
| Cerebral malaria | |
| History | Know the clinical manifestations of cerebral malaria<br>Know the endemic area of malaria |
| Physical | Be able to:<br>Identify the clinical manifestations of malaria<br>Assess mental status |
| Diagnosis | Be able to:<br>Know the diagnostic criteria for cerebral malaria<br>Safely perform a lumbar puncture when necessary |

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| | Accurately use a validated coma score |
| Management | Be able to:<br>Initiate the appropriate treatments of malaria<br>Manage the common acute complications of malaria eg raised intracranial pressure<br>Manage the potential long-term sequelae of cerebral malaria |
| Cerebral Abscess | |
| History | Know the etiologies of cerebral abscess in children<br>Know the clinical manifestations of cerebral abscess<br>Know the risk factors of cerebral abscess |
| Physical | Be able to:<br>Identify the clinical manifestations of cerebral abscess<br>Assess mental status<br>Identify papilledema as signs of increased intracranial pressure |
| Diagnosis | Know the value and limitations of neuro-radiology techniques<br>Be able to:<br>Interpret the laboratory findings in cerebral abscess<br>Safely perform a lumbar puncture when appropriate<br>Make appropriate use of neuro-radiological investigations |
| Management | Know the potential long-term sequelae of cerebral abscess<br>Know the common acute complications of cerebral abscess<br>Be able to:<br>Initiate the appropriate treatment of cerebral abscess<br>Manage the common acute complications (eg, cerebral oedema and raised intracranial pressure) |

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| | Involve neurosurgeons when appropriate |
| Myelitis | |
| History | Know the etiologies of myelitis in children<br>Know the clinico-anatomical correlation of spinal cord lesions |
| Physical | Be able to:<br>Identify the clinical manifestations of myelitis<br>Localize a spinal cord lesion |
| Diagnosis | Know the value and limitations of neuro-radiology techniques<br>Be able to:<br>Identify the laboratory diagnosis of myelitis<br>Safely perform a lumbar puncture when necessary<br>Make appropriate use of neuro-radiological investigations |
| Management | Be able to:<br>Assess and manage myelitis including appropriate antimicrobial therapy<br>Identify and manage the acute complications of myeltis (eg, cord oedema)<br>Carefully monitor fluid balance and electrolyte concentrations in myelitis<br>Manage the potential long-term sequelae of encephalitis |
| Cerebral Palsy | |
| History | Know the risk factors associated with cerebral palsy<br>Know the range of disabilities associated with cerebral palsy<br>Know the importance of family history and a careful perinatal history<br>Be able to:<br>Detect factors in the history that may predispose to the development of cerebral palsy |

## *Neurology*

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| Physical | Be able to:<br>Detect the clinical signs of cerebral palsy and distinguish type (eg, hemiplegia, diplegia, spastic, athetoid) |
| Diagnosis | Understand the role of neuroimaging in cerebral palsy |
| Management | Understand the impact of cerebral palsy on the child and the family<br>Be able to:<br>Work with a multidisciplinary team to provide the best care for children with cerebral palsy<br>Manage feeding problems associated with cerebral palsy<br>Manage spasticity together with specialists including physical and pharmacological therapies<br>Refer for orthopedic intervention appropriately<br>Work effectively with education services<br>Provide support and help for families including referral to support groups and respite care |
| Degenerative and demyelinating disorders (Rett Syndrome, leukodystrophies) | |
| History | Understand the importance of family history in neurodegenerative conditions<br>Know the range of aetiologies (genetic, metabolic, infective and unknown)<br>Know the ages at which different neurodegenerative diseases present<br>Know the clinical presentation and course of Rett Syndrome<br>Be able to:<br>Distinguish between neurodegenerative diseases and static non progressive neurological diseases |
| Physical | Be able to:<br>Assess the current developmental stage of the child<br>Identify any abnormal neurological features (eg, hand stereotypes and gait abnormalities in Rett syndrome) |
| Diagnosis | Know the diagnostic criteria for Rett syndrome<br>Be able to:<br>Initiate biochemical and genetic tests as appropriate |

## *Neurology*

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| Management | Know that some degenerative brain disorders are treatable and that the earlier the treatment the better the outcome |
| Childhood stroke syndrome | |
| History | Know the WHO definition of stroke<br>Know the etiologies of stroke (eg, arterial ischemic, venous thrombosis, hemorrhagic)<br>Be able to:<br>Elicit from the history risk factors for stroke (eg, sickle cell disease, trauma, infection, vasculitis, dehydration, nephrotic syndrome, substance abuse) |
| Physical | Be able to:<br>Undertake a neurological examination to determine the likely site of the lesion |
| Diagnosis | Know the importance of timing of neuro-radiologic investigations in determining a diagnosis<br>Be able to:<br>Select appropriate investigations to determine the cause<br>Make appropriate use of neuro-radiological investigations<br>Distinguish between stroke and hemiplegic migraine or Todd's paresis |
| Management | Be able to:<br>Counsel families on the risk of mortality and residual neurological impairment<br>Provide supportive management such as fever and fluid balance control<br>Consult with specialists about specific treatments such as exchange transfusion, blood transfusion, anticoagulation and anti platelets agents |
| Spinal cord diseases (eg, spinal cord compression, transverse myelitis, progressive myelopathy ) | |
| History | Know the etiologies of spinal cord diseases in children (eg, compression, tumour, myelitis)<br>Know the importance of atlanto-axial instability in the development of spinal cord problems<br>Be able to: |

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| | Elicit from the history and suggestion of bladder or bowel involvement<br>Identify conditions that predispose to progressive myelopathy |
| Physical | Be able to:<br>Identify the neurologic signs of spinal cord diseases<br>Assess localization of spinal cord diseases |
| Diagnosis | Be able to:<br>Select appropriate investigations to determine an infectious cause<br>Make appropriate use of neuro-radiologic investigations<br>Select other laboratory investigations as appropriate |
| Management | Know the common acute complications of spinal cord diseases<br>Know when neurosurgic intervention is indicated<br>Be able to:<br>Refer to specialists when appropriate<br>Counsel parents on the long-term prognosis of acute transverse myelitis |
| Peripheral Nerve and Nerve Roots (Neuropathies, Nerve injuries, Guillain-Barre Syndrome (GBS); Poliomyelitis; Bell's Palsy; Spinal Muscular Atrophy (SMA)) | |
| History | Know the etiologies of peripheral nerve diseases in children (eg, traumatic, infective, degenerative, inherited)<br>Know the risk factors for GBS (eg, preceding Campylobacter infection)<br>Be able to:<br>Identify the typical clinical features in the history of GBS<br>Identify features suggestive of SMA at different ages |
| Physical | Be able to:<br>Identify the features of Erb's, Klumke's and Bell's palsies |

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| | Identify the features of Charcot Marie Tooth (hereditary motor sensory neuropathy)<br>Identify the clinical features suggestive of SMA type 1 (Werdig Hoffman) in the neonatal period<br>Assess localization of peripheral nerve diseases<br>Identify fasciculation and muscle atrophy when present<br>Identify risk factors for respiratory failure or autonomic instability in GBS |
| Diagnosis | Understand the value and limitations of electrophysiologic techniques<br>Be able to:<br>Perform lumbar puncture to aid diagnosis in GBS<br>Select appropriate genetic investigations to aid diagnosis |
| Management | Be able to:<br>Provide symptomatic and supportive treatment of GBS<br>Initiate intravenous immunoglobulin treatment for GBS when indicated<br>Manage the common acute complications of peripheral nerve diseases<br>Involve specialists in the management as indicated<br>Counsel families in inherited neuropathies |
| Neuromuscular Junction (Myasthenia Gravis) | |
| History | Know the etiologies of neuromuscular junction diseases<br>Be able to:<br>Identify the common presenting symptoms of myasthenia gravis and congenital myasthenic syndromes |
| Physical | Be able to:<br>Identify the clinical manifestations of myasthenia gravis and other neuromuscular junction disorders<br>Perform fatigability tests<br>Arrange for a Tensilon test under appropriate conditions |

## *Neurology*

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| Diagnosis | Know the value of HLA testing in your own local population according to the HLA associations with myasthenia<br>Be able to:<br>Use antibody investigations to develop a diagnosis and be aware of the limitations<br>Confirm or exclude associated thymoma<br>Utilize electrophysiologic studies to confirm diagnosis |
| Management | Understand the role of immunosuppression in generalized myasthenia<br>Know the indications for thymectomy<br>Be able to:<br>Initiate treatment with anticholinesterase drugs as appropriate<br>Consult with specialists regarding management<br>Manage the common acute complications of neuromuscular junction diseases |
| Muscle Diseases (muscular dystrophies, myopathies, myotonias) | |
| History | Know the etiologies of muscle disease in children<br>Know the genetics of the muscular dystrophies<br>Be able to:<br>Determine from the history the pattern of muscle weakness |
| Physical | Be able to:<br>Identify the clinical manifestations of muscle disease<br>Assess muscle strength<br>identify Gower sign as an indication of proximal muscle weakness |
| Diagnosis | Know the value and limitations of muscle biopsy and neurophysiology tests<br>Know that determination of genotype in congential myopathies allows more informative genetic counseling and the possibility of antenatal diagnosis |

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| | Be able to:<br>Utilize biochemical investigations to help establish a diagnosis of children with muscle disorders and exclude multisystem disorders with muscle involvement (eg, mitochondrial cytopathies)<br>Formulate a differential diagnosis for a patient who has an acquired muscle disorder (eg, inflammatory, infectious, toxic) |
| Management | Know the common acute complications of muscle diseases<br>Know about the use of steroids in Duschenne muscular dystrophy<br>Be able to:<br>Initiate supportive treatments such as physiotherapy<br>Manage the potential long-term sequelae of muscle diseases (eg, contractures, scoliosis, and respiratory management)<br>Refer to specialists (eg, physiotherapists, neurologists, surgeons, geneticists) as appropriate |
| Chronic fatigue syndrome/myalgic encephalitis (CFS/ME) | |
| History | Be able to:<br>Identify the characteristics of the malaise typical of CFS/ME<br>Identify associated additional symptoms<br>Identify fluctuation in symptoms<br>Identify symptoms that may suggest an alternative diagnosis<br>Identify the common changes in sleep patterns seen in CFS/ME that may exacerbate fatigue symptoms (eg, insomnia, hypersomnia, sleep reversal, altered sleep–wake cycle and non-refreshing sleep) |
| Physical | Be able to:<br>Identify physical findings that may suggest an alternative diagnosis |
| Diagnostic | Understand that a diagnosis should be made if other diagnoses have been excluded and that symptoms have persisted for 3 months |

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| | Be able to:<br>Undertake basic screening investigations |
| Management | Be familiar with the evidence base of treatments and management strategies that have been shown to work and not to work in patients with CFS/ME<br>Be able to:<br>Provide symptomatic treatment for pain and sleep disturbance<br>Provide tailored sleep management including rest periods<br>Support patients to maintain independence<br>Advise family and other professionals about fitness for education and other activities<br>Refer to specialists if the symptoms are persistent<br>Work with others to provide a program of cognitive behavioural therapy, graded exercise therapy and activity management programmes<br>Counsel and support families about setbacks and relapses |
| CNS Trauma (see ***Emergency Medical Care***, ***Sports Medicine***, and ***Critical Care in Children***) | |

| **Congenital anomalies of the nervous system**<br>By the end of training, the resident should: | |
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| Spinal dysraphism and neural tube defects (including spina bifida, meningocele, myelomeningocele, anencephaly, encephaolocoele) | |
| History | Know the etiologies of neural tube defects<br>Know that a myelomeningocele is often associated with hydrocephalus and that the level of the lesion is major determinant in the need for shunt placement<br>Understand the importance of folic acid supplementation in the prevention of neural tube defects |
| Physical | Be able to:<br>Identify the clinical manifestations of neural tube defects |
| Diagnosis | Understand the principles and use of neuroradiologic imaging |

## *Neurology*

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| | Be able to:<br>Plan the diagnostic evaluation of spinal dysraphisms<br>Formulate the differential diagnosis of acute neurologic deterioration in a child with myelomeningocele<br>Identify the clinical and radiographic features of spina bifida occulta<br>Differentiate between the safe and unsafe neurogenic bladder |
| Management | Know the prognosis of spina bifida occulta<br>Be able to:<br>Counsel parents on the likely function and levels of disability based on level of defect<br>Manage, together with orthopedic teams, the most common orthopedic problems associated with a myelomeningocele<br>Manage, with the help of specialists as appropriate, the neurogenic bladder<br>Work with a multidiciplinary team to provide a coordinated management plan for a child with a neural tube defect |
| Hydrocephalus | |
| History | Identify symptoms that are suggestive of progressive hydrocephalus in infancy |
| Physical | Be able to:<br>Identify signs of progressive infantile hydrocephalus (eg, increasing head circumference, tense fontanelle, sunsetting sign)<br>Identify distended retinal veins as a sign of raised intracranial pressure<br>Identify a blocked shunt |
| Diagnosis | Understand the use of the VP ratio to diagnose hydrocephalus<br>Be able to:<br>Utilize neuro-radiologic investigations appropriately |
| Management | Know about the antenatal diagnosis of neural tube defects |

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| | Be able to:<br>Manage acute complications of CSF shunting including blockage, infection<br>Counsel families on the management of a shunt<br>Counsel families on long term prognosis including educational attainment<br>Consult with specialists as appropriate |
| Disorders of neuronal migration (eg, lissencephaly, porencephaly, holoprosencephaly, agenesis of the Corpus Callosum; agenesis of the cranial nerves) | |
| History | Understand the wide variation of clinical consequences of disorders of neuronal migration<br>Know that when agenesis of the corpus callosum is an isolated abnormality the patient may be normal |
| Physical | Be able to:<br>Identify the neurologic signs associated with disorders of neuronal migration |
| Diagnosis | Know the association of absent corpus callosum with genetic defects<br>Be able to:<br>Consider the possibility of lissencephaly in a child with failure to thrive, microcephaly, seizures and developmental delay<br>Consult with an imaging specialist and utilize neuro-radiological imaging appropriately |
| Management | Be able to:<br>Manage the potential long-term sequelae of congenital anomalies of the CNS<br>Refer to specialists when necessary<br>Utilize the ethical principles involved in management decisions<br>Communicate effectively with parents |
| Neurocutaneous syndromes (eg, neurofibromatosis, tuberous sclerosis) (see ***Dermatology***) | |

Updates:

## *Neurology*

October 24, 2013 – Meningitis updated and revised

## *Oncology*

| **General**<br>By the end of training, the resident should: | |
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| History | Know that signs and symptoms of cancer are variable and non-specific in pediatric patients<br>Know that hematopoietic malignancies (leukemia, lymphoma) are the most common childhood cancers<br>Know the variability in the age-specific incidence of childhood cancers<br>Know the difference in incidence of childhood cancer in different ethnic groups<br>Know that general malignant masses are firm, fixed, and non-tender in contrast to infectious or inflammatory lumps<br>Know that some children have a genetic susceptibility to cancer and should be screened appropriately<br>Know the common cancers occurring in your locality<br>Be able to:<br>Identify symptoms associated with the most common manifestations of childhood cancers (eg, leukemias, lymphomas, brain tumors, solid tumors, soft tissue sarcomas and bone tumors)<br>Identify predisposing or risk factors for development of selected childhood cancers (eg, exposure to ionizing radiation or chemotherapy, race, family history, infections, immunodeficiency, and congenital anomalies) |
| Physical | Be able to:<br>Identify and note pain, cachexia, pallor, and/or respiratory distress<br>Measure palpable masses<br>Quantify lymphadenopathy and organomegaly when present<br>Identify rashes, bruises, and petechiae while examining the skin<br>Perform neurologic and ophthalmologic examinations when headache or vomiting is present |
| Diagnosis | Be able to:<br>Perform initial screening tests for common malignancies |

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| | Review the peripheral blood smear findings<br>Identify and rule out the infections that masquerade as a potential malignancy<br>Identify some hematologic and musculoskeletal diseases that may mimic malignancies<br>Recognize benign tumors that can be confused with childhood malignancies<br>Utilize results of chest X-ray, ultrasound, CT-scan and MRI in childhood malignancies<br>Work effectively with pathologists and cancer specialists to establish the diagnosis |
| Management | Be able to:<br>Initiate management in common presentations of non-malignant disorders<br>Manage common symptoms associated with oncologic disease and side effects of drugs used to treat it (eg, blood product support, nausea and vomiting, mucositis)<br>Consult effectively with specialists<br>Work effectively with specialist nurses and members of palliative care teams<br>Explain to patients/parents the common short- and long-term effects of chemotherapy and radiotherapy<br>Educate children and parents regarding means of preventing cancer such as immunization against hepatitis B and human papilloma virus<br>Encourage healthy life style very early to reduce risk of cancer (eg, avoidance of tobacco and alcohol, high fat diets, and obesity)<br>Manage oncologic emergencies that arise as adverse effects of tumors or their therapy |

| **Neoplastic disorders**<br>By the end of training, the resident should: | |
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| Hematologic malignancies | |
| Leukemias | |
| History | Know that acute leukemias represent a clonal expansion and arrest at a specific stage of normal lymphoid or myeloid hematopoeisis |

## *Oncology*

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| | Know acute leukemias constitute 97% of all childhood leukemias and 25-30% of all cancers<br>Know chronic leukemias constitute only 3% of childhood leukemias and consist of two types (Philadelphia chromosome positive and Juvenile myelomonocytic leukemia)<br>Know that the etiology of acute leukemia is unknown<br>Know that symptoms of acute leukemias are related to the infiltration of leukemic cells into normal tissues, resulting in either bone marrow failure (eg, anemia, neutropenia, and thrombocytopenia) or specific tissue infiltration (eg, lymph nodes, liver, spleen, brain, bone, and skin)<br>Know that the central nervous system and testes are important sites of relapse of acute lymphoblastic leukemia<br>Be able to<br>Consider leukemia in children with lethargy, loss of appetite, infection, bruising and bleeding, bone pain and other suggestive symptoms |
| Physical | Be able to:<br>Quantify lymphadenopathy and hepatosplenomegaly<br>Identify signs of central nervous system (CNS) and testicular involvement in acute lymphoblastic leukemia (ALL)<br>Identify the immediate dangers of leukemia to the newly presenting child |
| Diagnosis | Know that anemia and thrombocytopenia are common in patients with leukemia<br>Know that WBC counts may be low, high, or normal<br>Be able to:<br>Initiate relevant investigations to diagnose leukemia<br>Interpret the findings of immature blast cells on either peripheral smear, bone marrow<br>Perform a lumbar puncture at time of diagnosis to evaluate the possibility of CNS involvement<br>Perform a chest x-ray to exclude an anterior mediastinal mass, which is commonly seen in T-cell ALL<br>Monitor electrolyte, calcium, phosphorus, uric acid and renal and hepatic function in all patients |

## *Oncology*

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| Management | Understand that different childhood leukemias (eg, ALL, AML, chronic leukemias) have distinct therapies and outcomes<br>Understand that the treatment of leukemia requires both the eradication of the leukemic clone and supportive care during a period on bone marrow failure which is secondary to disease and treatment<br>Understand that most patients with acute lymphoblastic leukemia will be cured of their disease using current treatment strategies<br>Know about the late sequelae of leukemia therapy<br>Be able to:<br>Work collaboratively with cancer specialists<br>Counsel families on the short and long-term complications and prognosis of acute leukemia<br>Manage the short-term complications promptly<br>Explain complications of neutropenia in patients with acute leukemia and manage the patients without delay<br>Provide prophylaxis therapy for prevention of Pneumocystis jiroveci (carinii) to patients with T-cell immunosuppression<br>Provide varicella-zoster immune globulin to patients with no immunity against varicella |
| Lymphomas (Hodgkin's disease and non-Hodgkin's lymphoma (NHL)) | |
| History | Be aware that there is evidence that Epstein-Barr virus may have a causal role in both major types of lymphoma<br>Know about the genetic abnormalities seen in NHL and how these may affect diagnosis and prognosis<br>Know incidence of Hodgkin's disease with regard to age groups<br>Understand factors that play a role in the incidence of NHL<br>Be aware that Burkett lymphoma is divided into two forms: 1) a sporadic form commonly seen in different parts of the world and, 2) an endemic form commonly seen in Africa with a strong association with Epstein-Barr virus<br>Be able to:<br>Elicit the wide range of symptoms with which the patient can present dependant on the site of the primary |

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| | lymphoid mass and features of disseminated disease (eg fatigue, pain, anemia) |
| Physical | Be able to:<br>Identify the clinical signs of Hodgkin's disease and non-Hodgkin's lymphoma<br>Identify the features which suggest lymphadenopathy may be malignant<br>Identify supraclavicular lymph node enlargement |
| Diagnosis | Know that the chest x-ray is an important part of the initial evaluation of the patient with an unexplained lymphadenopathy<br>Understand the role of imaging techniques such as ultrasound, MRI, CT scan for determining the extent of the disease<br>Be able to:<br>Interpret the initial laboratory investigations in a suspected case of lymphoma<br>Differentiate malignant and benign conditions that have similar presentations to lymphoma |
| Management | Understand the roles of chemotherapy and radiotherapy in the management of lymphomas<br>Understand that overwhelming sepsis is a serious complication in patients with Hodgkin's disease who have undergone splenectomy<br>Be able to:<br>Work collaboratively with cancer specialists<br>Describe early and late adverse effects of treatment of lymphomas to families<br>Explain to parents the excellent prognosis of Hodgkin's disease |
| Neuroblastoma | |
| History | Know that neural crest cells are the origin of this tumor<br>Know that neuroblastoma is the most common extra-cranial solid tumor of childhood and the most common malignancy in infancy |

## *Oncology*

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| | Know that the most common presentation of neuroblastoma is abdominal pain or mass<br>Understand that presentation is very variable because of early dissemination and origin anywhere along the sympathetic chain<br>Be able to:<br>Elicit the common symptoms with which a child may present (eg, anemia, bruising , fever, lethargy, irritability, abdominal mass or pain) |
| Physical | Be able to:<br>Identify an abdominal mass on palpation<br>Recognize signs of spinal cord compression by paraspinal tumors<br>Identify proptosis and peri-orbital bruising as a characteristic but rare presentation<br>Elicit findings of the paraneoplastic syndromes associated with this tumor such as opsoclonus and myoclonus |
| Diagnosis | Understand the role of full blood count and plain x-ray films in initial screening<br>Know that genetic mutations at chromosome 6p 22 is associated with high-risk disease<br>Be able to:<br>Interpret catecholamine (VMA, HVA) levels in the urine as screening test<br>Appropriately utilize CT of the chest, abdomen and pelvis with bone scan and bone marrow aspiration and biopsies as needed to complete the diagnosis<br>Select appropriate genetic investigations<br>Consider Wilms tumor and child abuse as part of the differential diagnosis |
| Management | Be aware of the international staging system for neuroblastoma<br>Understand the roles of surgery and chemotherapy<br>Know that children with favorable staging who undergo a gross total resection require no further therapy<br>Know that stage 4S is associated with spontaneous regression and good overall survival |

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| | Know the factors which affect prognosis (eg age, stage, genetics)<br>Be able to:<br>Work collaboratively with cancer specialists<br>Initiate emergency management of spinal cord compression from neuroblastoma as it may cause irreversible neurologic deficit<br>Explain the complications of aggressive chemotherapy and radiation therapy used to treat high-risk neuroblastoma to families |
| Wilms tumor | |
| History | Know the primitive tissue from which Wilms tumor is thought to arise<br>Understand the role of genes and genetic predisposition in this tumor<br>Know that Wilms tumor is the most common malignant renal tumor of childhood<br>Know that Wilms tumor is associated with hemihypertrophy, aniridia, somatic overgrowth, and/or genitourinary abnormalities<br>Be able to:<br>Elicit the symptoms suggestive of Wilms tumor (eg, abdominal pain or mass, hematuria, fever) |
| Physical | Know that hypertension is seen in 5-10% of patients<br>Be able to:<br>Elicit the clinical signs of Wilms tumor (eg, abdominal mass, hypertension)<br>Identify other features which may be associated with it (eg aniridia, hemi-hypertrophy) |
| Diagnosis | Be able to:<br>Order abdominal ultrasound and CT-scan to distinguish intra-renal mass from masses in surrounding structures<br>Identify sites of extension or metastasis (eg, inferior vena cava) and the lungs |

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| | Interpret full blood count, urinalysis, liver, and renal function studies<br>Include other masses such as hydronephrosis, polycystic disease of the kidney, neuroblastoma, lymphoma, and retroperitoneal rhabdomyosarcoma in the differential diagnosis |
| Management | Understand the roles of pre- and post-operative chemotherapy, surgery, and radiotherapy<br>Be able to:<br>Work collaboratively with cancer specialists<br>Discuss risk of late complications of therapy in survivors of Wilms tumor with families<br>Explain to parents that the prognosis for patients with Wilms tumor is generally very good |
| Central nervous system tumors (brain and brain stem tumours, craniopharyngioma) | |
| History | Know that in contrast to adult CNS tumors, which are secondary or metastatic from other carcinomas, CNS tumors in children are primary and originate in CNS and include low-grade astrocytomas or embryonic neoplasms<br>Know that cranial nerve deficits may be associated with brain tumors<br>Understand the neuro-endocrine effects of pituitary involvement<br>Understand that symptoms of brain tumors arise from impingement on normal tissue (eg, cranial nerves) or by increase in intracranial pressure caused either by obstruction of cerebrospinal fluid flow or by direct mass effect<br>Know the usual presentation of craniopharyngioma (eg, visual failure, endocrinopathy)<br>Be able to:<br>Elicit a history of inherited syndromes that have an increased risk for developing a CNS tumor (eg, neurofibromatosis, tuberose sclerosis, Von Lippel-Lindau)<br>Elicit common presenting symptoms of a brain tumour (eg, headache, deteriorating school performance, ataxia, emesis) |
| Physical | Be able to:<br>Perform careful neurologic assessment including visual fields and fundoscopic examination in all children with suspected brain tumor |

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| | Identify the clinical signs seen in children with brain tumors (eg, cranila nerve palsies and raised intracranial pressure effects) |
| Diagnosis | Be able to:<br>Utilize magnetic resonance imaging (MRI) and computed tomography (CT) to diagnose CNS tumors<br>Avoid lumbar puncture before performing a CT scan or MRI<br>Consider other CNS lesions, such arteriovenous malformations, brain abscess, granulomatous diseases and intracranial hemorrhage in the differential diagnosis |
| Management | Understand the role of dexamethasone in the initial immediate therapy<br>Understand the roles of surgery, chemotherapy, and radiotherapy in the management<br>Know about somnolence syndrome after radiation therapy and posterior fossa syndrome after surgery<br>Be able to:<br>Work collaboratively with cancer specialists<br>Explain the short- and long-term adverse effects of therapy<br>Discuss the prognosis with patient and families |
| Bone and soft tissue tumors (rhabdomyosarcoma, osteosarcoma, Ewing sarcoma) | |
| History | Be aware that Ewing sarcoma and osteosarcoma are the most common malignant bone tumors in children and that both may metastasize to the lungs<br>Know that Ewing sarcomas are thought to be of neural crest cell origin and osteosarcomas derive from primitive bone forming mesenchymal stem cells<br>Know that there is a 500 fold increased risk for osteosarcoma for individuals with hereditary retinoblastoma<br>Know that, as late complication of cancer therapy (eg, chemo and radiation therapy), some individuals may develop sarcoma as a second malignancy<br>Know that a more delayed presentation is common in peri-osteal sarcomas<br>Know that rhabdomyosarcoma is the most common soft tissue sarcoma in children and that it is derived from |

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| | mesenchymal cells committed to skeletal muscle lineage<br>Know that rhabdomyosarcoma peaks in children 2-6 years of age and in adolescents<br>Be able to:<br>Elicit symptoms associated with rhabdomyosarcoma dependant on site (eg, head and neck: visual disturbances, nasal airway and ear symptoms, cranial nerve palsy; and genito-urinary tract: hematuria, urinary obstruction)<br>Elicit the most common presenting symptoms of osteosarcoma and Ewings sarcoma (eg, bone pain or swelling) |
| Physical | Be able to:<br>Identify the clinical signs of rhabdomyosarcoma, taking into consideration site of origin, subsequent mass effect, and presence of metastatic disease<br>Identify the clinical features of osteoid osteoma |
| Diagnosis | Be able to:<br>Order tissue biopsy to make a definitive diagnosis of sarcomas<br>Utilize appropriate plain radiography, MRI, and CT scan in diagnosis of bone and soft tissue sarcomas |
| Management | Know that the risk of occult metastasis in osteosarcoma is high and local tumor surgery should be accompanied by chemotherapy<br>Know that poor prognostic features of osteosarcoma include incomplete resection and poor response to chemotherapy<br>Know the roles of chemotherapy, surgery, and radiotherapy in the treatment of Ewings sarcoma<br>Know about risk group stratifications in rhabdomyosarcoma and the relationship to prognosis<br>Be able to:<br>Work collaboratively with cancer specialists<br>Explain the short- and long-term adverse effects of therapy to patients and families including loss of a limb or |

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| | function<br>Discuss the prognosis with families |
| Histiocytosis syndromes of childhood (Langerhans cell histiocytoses) | |
| History | Know that these disorders may involve both bone and soft tissues<br>Be able to:<br>Elicit symptoms with which histiocytosis syndromes may present( eg, skin lesions, diabetes insipidus, failure to thrive) |
| Physical | Be able to:<br>Identify the organs commonly involved in these syndromes<br>Recognize painful bony lesions as a manifestation of histiocytosis<br>Identify the cutaneous eruptions seen in these disorders |
| Diagnosis | Be able to:<br>Consider osteomyelitis, malignant bone tumors, and bony cysts in the differential diagnosis<br>Identify the criteria necessary for diagnosis of Langerhans cell histiocytosis<br>Perform a chest radiograph and skeletal survey initially at diagnosis<br>Order the required laboratory and radiological investigations for a newly diagnosed patient |
| Management | Know about staging of histiocytoses<br>Understand that treatment depends on the site and extent of organ system involvement<br>Be able to:<br>Collaborate with specialists regarding management |
| Other tumors (eg, germ cell, retinoblastoma and liver [hepatoblastoma]) | |
| History | Know that retinoblastoma is the most common intraocular tumor of childhood<br>Understand the hereditary and non-hereditary risk factors for retinoblastoma |

## *Oncology*

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| | Know about the genetic mutations associated with retinoblastoma<br>Know that hereditary retinoblastoma frequently involves both eyes and presents at a younger age than sporadic retinoblastoma<br>Know that primary hepatic neoplasms are rare and that hepatoblastoma and hepatocellular carcinoma are the two most common primary malignancies<br>Know that malignant germ cell tumors constitute 3% of all cancers<br>Know the genetic abnormalities associated with germ cell tumors<br>Know that the symptoms of germ cell tumors are dependent on the site of origin and on certain histologic variants<br>Be able to<br>Elicit symptoms associated with retinoblastoma(eg, strabismus, inflammatory changes in the eye)<br>Elicit the symptoms associated with liver tumor (eg, abdominal mass and pain, weight loss, anorexia)<br>Elicit the clinical features of germ cell tumors taking into consideration the different sites |
| Physical | Be able to:<br>Identify loss of red reflex seen in retinoblastoma<br>Identify masses associated with liver tumors and germ cell tumors |
| Diagnosis | Know that early diagnosis of retinoblastoma is essential for effective treatment that aims at preserving as much vision as possible<br>Know that serum alpha-fetoprotein and beta-human chorionic gonadotropin may be markers of germ cell tumors and hepatoblastoma<br>Be able to:<br>Select appropriate radiology (eg, ultrasound, CT, MRI) to aid diagnosis |
| Management | Know that treatment strategies for germ cell tumors depend on the histologic subtype, site of origin, and the stage of the disease |

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| | Know that survival in hereditary retinoblastoma is much worse than in sporadic disease<br>Be able to:<br>Refer retinoblastoma cases to specialized centers to maximize the preservation of useful vision<br>Explain to parents that the 5-year survival for children with retinoblastoma is good<br>Explain to parents that recurrent disease carries a poor prognosis<br>Provide frequent ocular examinations in children with a positive family history of retinoblastoma<br>Collaborate with cancer specialists about the management of children with germ cell and liver tumors |

| **Complication of diseases and/or management**<br>By the end of training, the resident should: | |
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| Pain (see ***Palliative Care; Emergency Medical Care;*** and ***Pharmacology)*** | |
| Infection and sepsis (see also ***Infectious Diseases*** and ***Hematology***) | |
| | Be aware that cancer patients are at risk for serious infection because of their impaired immune response, particularly during periods of neutropenia<br>Realize that fever is the most common and often the first manifestation of a life-threatening infection such as septic shock<br>Be able to:<br>Prescribe appropriate antibiotic therapy to a child with cancer presenting with fever and neutropenia |
| Spinal cord compression (see also ***Neurology***) | |
| | Know that a spinal tumor often presents with signs and symptoms of spinal cord compression<br>Know that neuroblastoma is the most common cause of spinal cord compression<br>Be able to:<br>Identify the neurologic signs associated with spinal cord compression<br>Identify epidural tumor when it causes spinal cord compression |

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| | Refer to specialists urgently |
| Malignant hypercalcemia | |
| | Know that hypercalcemia of malignancy is very rare but potentially produces fatal complications in children, relative to adults<br>Know that intravenous pamidronate is an effective treatment for severe hypercalcemia in children but monitoring is required to avoid hypocalcemia<br>Be able to:<br>Provide hydration as the main modality of treatment of hypercalcemia |
| Bone marrow suppression | |
| | Know the definition, signs and symptoms, complications and treatment of bone marrow suppression<br>Be able to:<br>Take the necessary measures to prevent bone marrow suppression in children with cancer |
| Tumor lysis syndrome (TLS) | |
| | Know that TLS is a very serious and a life-threatening complication of cancer therapy<br>Know that TLS may occur spontaneously or be secondary to treatment-related tumor necrosis<br>Know about preventative treatment incluing forced diuresis, uric acid lowering agents, and steroid based cyto-reductive treatment<br>Be able to:<br>Identify the metabolic abnormalities commonly observed in TLS<br>Identify high-risk patients in whom to initiate preventive therapy<br>Initiate proper fluid management, correction of metabolic abnormalities, and attention to infections are the mainstay of therapy |

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| **Long-term sequelae of cancer therapy**<br>By the end of training, the resident should: |

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| | Know the long-term sequelae of cancer including late recurrence of primary cancer, secondary tumor, growth impairment, endocrine dysfunction, infertility , educational and psychological effects, and toxic damage to organs from treatment<br><br>Know the risk factors for late effects (eg, type of cancer, site, age at onset, overall health before the cancer, and child's genetic makeup)<br><br>Be able to:<br><br>Provide long term follow up for survivors of cancer pr0viding appropriate surveillance for the long term effects |

## *Ophthalmology*

| **General (including normal vision development)**<br>By the end of training, the resident should: | |
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| History | Know the critical periods in development of visual function and binocular vision<br>Understand the periods of critical and plastic visual development<br>Know major causes of congenital blindness and visual defects<br>Know the common and preventable causes of visual impairment<br>Know that central nervous system disorders are the most common cause of visual impairment<br>Know about the specific developmental patterns that occur in the child with visual impairment<br>Know the major chromosomal abnormalities causing ophthalmologic abnormalities (eg, aniridia)<br>Understand the genetics of achromatopsia<br>Understand the ocular manifestations of systemic disease (eg, diabetes mellitus, hyperthyroidism, collagen diseases, Kawasaki disease, and Marfan syndrome)<br>Know the common causes of red eye<br>Be able to:<br>Identify symptoms that suggest a child may have a visual impairment<br>Take a relevant history for a child with suspected visual impairment including prenatal , birth and developmental history, drugs, family history, and educational concerns<br>Elicit whether visual impairment is likely due to perceptual visual difficulties of central nervous system disorders rather than ophthalmologic problems |
| Physical | Know the normal appearance of the retina<br>Know about specialized methods of examination including electrophysiological studies and fluroscein angiography<br>Be able to:<br>Examine the eye of a child, including corneal reflexes<br>Use an ophthalmoscope |

## *Ophthalmology*

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| | Identify retinal abnormalities (eg, papilloedema, abnormal vessels, pigmentation, retinal hemorrhage)<br>Identify common manifestations of genetic and systemic eye disease<br>Identify and interpret abnormal eye movements, including abnormal alignment |
| Diagnosis | Know the value of fundal examination in suspected child abuse cases and certain developmental syndromes<br>Be able to:<br>Form a differential diagnosis of the child with suspected visual impairment |
| Management | Understand refractive errors and their correction<br>Know about educational approaches to the child with visual impairment<br>Know about support at school and other resources for children with visual impairments<br>Be able to:<br>Treat common eye infections<br>Identify abnormalities requiring urgent treatment<br>Identify children who need referral to ophthalmologist<br>Consult effectively with specialists |

| **Extraocular**<br>By the end of training, the resident should: | |
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| Alignment and movement disorders (including strabismus, amblyopia, nystagmus, ptosis ) | |
| History | Know that strabismus may be a sign of underlying organic disease<br>Be aware of syndromes in which strabismus is a feature (eg, Duane, Moebius, Brown)<br>Know conditions that may present with strabismus (eg, retinoblastoma, optic nerve atrophy, cataract, cranial nerve palsies)<br>Know the different forms of amblyopia (eg, strabismic, refractive, occlusion) |

## *Ophthalmology*

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| | Understand conditions that may lead to amblyopia<br>Know that congenital nystagmus may be familial<br>Know the sensory causes of congenital nystagmus (eg, albinism, Leber's amaurosis, aniridia)<br>Know the causes of acquired nystagmus (eg, tumors and neurodegenerative diseases)<br>Know the congenital and acquired causes of ptosis<br>Be able to:<br>Elicit whether abnormal movements or alignment are congenital or acquired<br>Take a careful family history |
| Physical | Understand the terminology used in describing strabismus (eg, convergent/divergent, latent/manifest, incomitant /comitant)<br>Be able to:<br>Undertake a full neurologic examination as appropriate<br>Perform a cover test<br>Detect and accurately describe the type of strabismus<br>Differentiate between latent and manifest squint<br>Identify nystagmus and ptosis |
| Diagnosis | Know the indications for a tensilon test in the diagnosis of ptosis<br>Be able to:<br>Distinguish between pseudo-strabismus and true strabismus<br>Distinguish between latent and manifest strabismus |
| Management | Understand the importance of the early detection of strabismus to prevent amblyopia<br>Understand the importance of correction of refraction in children with alignment and movement disorders |

## *Ophthalmology*

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| | Know the management of amblyopia with visual correction and patching<br>Know that treatment of nystagmus may include correction of associated refractive errors, and in selected cases may need surgery<br>Know that if the pupil is occluded in ptosis then early surgery is need to prevent amblyopia<br>Be able to:<br>Refer to an ophthalmologist appropriately |
| Conjunctivitis and uveitis | |
| History | Know the microbiology of conjunctivitis in neonates and older children<br>Know the worldwide importance of chronic chlamydial infection and its relationship to blindness<br>Know that conjunctival dryness can occur due to vitamin A deficiency<br>Know the relationship between arthritis and uveitis<br>Be able to:<br>Identify features that may predispose to the development of conjunctivitis or uveitis |
| Physical | Be able to:<br>Identify conjunctivitis and uveitis |
| Diagnosis | Be able to:<br>Distinguish between allergic and infectious conjunctivitis |
| Management | Know the treatment of conjunctivitis<br>Know the need for screening for uveitis in children with juvenile arthritis<br>Be able to:<br>Provide treatment for conjunctivitis if indicated<br>Advise on methods of prevention of conjunctivitis (eg, neonatal prophylaxis, hand washing) |
| Orbital and periorbital (preseptal) cellulitis | |

## *Ophthalmology*

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| History | Know the role that ethmoid sinus infections play in periorbital and orbital cellulitis<br>Know the microbiology and pathogenesis of orbital and periorbital cellulitis<br>Be able to:<br>Identify predisposing factors (eg, recent sinusitis or skin infection) |
| Physical | Be able to:<br>Identify the signs of orbital and preorbital cellulitis |
| Diagnosis | Understand the role of imaging in distinguishing pre-septal cellulitis from orbital cellulitis (ie, CT scan)<br>Be able to:<br>Select appropriate laboratory investigations |
| Management | Understand that orbital cellulitis is an ophthalmologic emergency and may cause visual and/or life-threatening complications<br>Be able to:<br>Initiate appropriate treatment of orbital and periorbital cellulitis<br>Recognize acute complications of orbital cellulitis<br>Refer appropriately to a specialist |
| Stye, chalazion | |
| History | Be able to:<br>Differentiate from the symptoms whether a lump on the eye is likely to be a stye or a chalzion (eg, a stye is red and painful, chalazion often asymptomatic) |
| Physical | Be able to:<br>Identify stye or chalazion |
| Diagnosis | Be able to:<br>Differentiate between stye and chalzion based on history and physical examination |

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| Management | Be able to:<br>Provide appropriate management of a stye and a chalazion<br>Counsel families about risk of recurrence |
| Nasolacrimal duct obstruction/dacrocystitis | |
| History | Be able to:<br>Elicit from the history symptoms suggestive of nasolacrimal duct obstruction with or without secondary infection |
| Physical | Be able to:<br>Identify nasolacrimal duct obstruction and dacrocystitis |
| Diagnosis | Understand the indications for a dacrocystogram<br>Be able to:<br>Differentiate between nasolacrimal duct obstruction and conjunctivitis |
| Management | Know that congenital nasolacrimal duct obstruction and obstruction after facial injury may spontaneously improve<br>Be able to:<br>Refer to an ophthalmologist for surgical correction |
| Proptosis | |
| History | Know the common causes of proptosis |
| Physical | Be able to:<br>Conduct an examination of the eyes to identify proptosis<br>Examine for signs of relevant systemic disease |
| Diagnosis | Be able to:<br>Initiate appropriate investigations to formulate a diagnosis of the cause of poptosis |
| Management | Be able to: |

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| | Refer to an ophthalmologist for treatment |

| **Intraocular** | |
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| Childhood glaucoma | |
| History | Know that glaucoma may be primary or secondary<br>Know the genetics of primary glaucoma<br>Know causes of secondary glaucoma (eg, Reiger syndrome, iritis, cataract sugery, steroids, Sturge- Weber syndrome)<br>Be able to:<br>Elicit a history of symptoms suggestive of glaucoma (eg, watering, photophobia, visual problems) |
| Physical | Be able to:<br>Identify enlarged cornea seen in congenital glaucoma<br>Identify signs seen in conditions causing secondary glaucoma (eg, abnormal pupil shape in Reiger syndrome) |
| Diagnosis | Know that diagnosis is made by measuring intraocular pressure |
| Management | Be able to:<br>Refer to an ophthalmologist |
| Cataracts | |
| History | Know the causes of congenital cataracts (eg, genetic, congenital infections, metabolic disorders, dysmorphic syndromes)<br>Know the causes of secondary cataracts (eg, radiation, corticosteroid)<br>Be able to:<br>Identify risk factors for the development of cataracts |
| Physical | Be able to: |

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| | Identify cataracts on examination of the eye<br>Identify dysmorphic features of syndromes associated with cataracts (eg, trisomies 21, 13, 18, Lowe's syndrome, cri du chat) |
| Diagnosis | Be able to:<br>Select investigations to exclude causes such as congenital infection or metabolic disease |
| Management | Be able to:<br>Refer to an ophthalmologist |
| Disorders of the optic nerve (optic atrophy, optic disc hypoplasia, optic neuritis, papilledema) | |
| History | Know the causes of optic atrophy (eg, genetic, perinatal asphyxia, mitochondrial disorders, meningitis/encephalitis, compression)<br>Know that most cases of optic hypoplasia are idiopathic but that there are secondary causes or associations (eg, genetic, aniridia, maternal diabetes, maternal substance abuse, septo-optic dysplasia)<br>Know the causes of optic neuritis (eg, multiple sclerosis, systemic lupus erythematosis)<br>Understand the association between papilledema and raised intracranial pressure<br>Understand importance of decreased vision in papilledema<br>Be able to:<br>Consider diseases of the optic disc in children with decreased vision and elicit potential causes |
| Physical | Be able to:<br>Identify abnormalities of the optic disc on examination of the fundus<br>Define visual function and any visual loss |
| Diagnosis | Be able to:<br>Distinguish between the different optic disc abnormalities<br>Select investigations to identify potential causes (eg, genetic, neuroimaging) |

## *Ophthalmology*

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| Management | Know the importance of urgent control of raised intracranial pressure with severe papilledema<br>Be able to:<br>Consult with appropriate specialist (eg, ophthalmologist, neurologist) |
| Retinopathy of prematurity (see ***Critical Care in Neonates***) | |
| Hemorrhagic problems | |
| History | Know the major causes of ocular hemorrhagic problems |
| Physical | Be able to:<br>Recognize the clinical manifestations of subconjunctival, retinal, and vitreous hemorrhages |
| Diagnosis | Be able to:<br>Identify hemorrhagic signs in order to make a diagnosis |
| Management | Be able to:<br>Plan the appropriate treatment for hemorrhage according to the underlying diagnosis |
| Retinoblastoma and tumors of the peri-orbital region (see ***Oncology***) | |

| **Trauma** (including foreign bodies, corneal abrasions) (see also ***Emergency Medical Care***)<br>By the end of training, the resident should: | |
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| History | Know that a corneal abrasion may occur as a result of birth trauma<br>Know the association between the use of contact lenses and corneal abrasions<br>Be able to:<br>Obtain an accurate history of the type and timing of trauma |
| Physical | Know that although corneal abrasions may be seen with an opthalmoscope, slit lamp examination with fluoroscopy may give more information<br>Be able to:<br>Use the appropriate examination for a suspected foreign body in the eye |

## *Ophthalmology*

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| | Identify corneal abrasions (eg, corneal edema)<br>Evaluate trauma to the eye, including hyphema<br>Identify the clinical signs of a “blow-out” fracture of the orbit |
| Diagnosis | Be able to:<br>Distinguish between corneal abrasion and congenital glaucoma in a neonate corneal clouding in a neonate |
| Management | Be able to:<br>Remove foreign bodies or refer to specialist<br>Prescribe topical antibiotics to prevent secondary infection if indicated<br>Refer to appropriate specialist for treatment (eg, ophthalmologist, surgeon) |

## *Oral & Dental*

| **General**<br>By the end of training, the resident should: | |
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| History | Understand the association of conditions and medical treatment (eg, certain drugs, cancer and chemotherapy, AIDS, gastroesophageal reflux) with the oral health of the child<br><br>Know the number of primary and permanent teeth and the disturbances in number, shape, eruption and shedding of teeth |
| Physical | Be able to:<br><br>Perform a complete clinical oral examination<br><br>Perform an oral health risk assessment<br><br>Use and interpret the Caries Risk Assessment Tool (http://www.aapd.org/media/Policies_Guidelines/G_CariesRiskAssessment.pdf)<br><br>Identify oral and dental trauma<br><br>Identify oral manifestations of general health problems<br><br>Identify oral and peri-oral tissue lesions<br><br>Identify early symptoms of dental caries and erosion<br><br>Identify developmental anomalies of the teeth<br><br>Identify disturbances in number, shape, eruption and shedding of teeth at the appropriate age of the child |
| Diagnosis | Be able to:<br><br>Diagnosis common childhood oral/dental problems |
| Management | Be able to:<br><br>Refer children at risk of developing oral diseases to an appropriate dentist |

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| | Refer appropriately those with oral and dental trauma |

| **Specific diseases**<br>By the end of training, the resident should: | |
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| Primary herpetic gingivostomatitis | |
| History | Know that it is caused by herpes simplex virus (HSV) following the first exposure to the virus<br>Be able to:<br>Elicit a history suggestive of oral herpetic gingivostomatitis (eg, fever, headache, pain, and malaise followed within 1 to 2 days by eruption on the oral mucosa) |
| Physical | Be able to:<br>Identify herpetic lesions |
| Diagnosis | Be able to:<br>Differentiate between herpes simplex virus and other viral enanthems |
| Management | Know that antiviral agents are most effective when begun before the development of the vesicles<br>Be able to:<br>Provide supportive treatment with pain relief and fluids to maintain hydration<br>Apply topical anesthetic ointment to facilitate eating if appropriate<br>Manage severe cases with hospitalization and antiviral agents |
| Oral candidiasis (thrush) | |
| History | Know that thrush affects a small percentage of normal newborns<br>Know that candida albicans becomes pathogenic in the oral environment in cases of general impairment due to immunological or hormonal imbalance |

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| | Be able to:<br>Elicit features in the history that increase susceptibility to candidiasis (eg, use of antibiotics, immunosuppressive drugs) |
| Physical | Be able to:<br>Identify the typical lesions (ie, raised pearly white patches that can be rubbed off leaving an erythematous or bleeding mucosa surface) |
| Diagnosis | Be able to:<br>Formulate a differential diagnosis for candidiasis |
| Management | Be able to:<br>Prescribe antifungal medications when treatment is warranted |
| Soft tissue, ulceration lesions and tumors | |
| History | Be able to:<br>Identify from the history the time over which the lesion has developed and any associated symptoms |
| Physical | Be able to:<br>Identify common oral tissue lesions:<br>*White soft tissue lesions:* chemical burn, palatal cystis of the newborn (Epstein's pearls, Bohn's nodules), gingival cysts of the newborn<br>*Dark soft tissue lesions:* erythematous candidiasis, eruption hematoma and cyst, physiologic pigmentations (racial pigmentation), epulides<br>*Ulcerative lesions:* aphthous ulcer, secondary herpetic ulcer, angular chelitis, traumatic ulcer<br>*Acute inflammatory lesions*: abscess, cellulitis, mucocele, ranula<br>*Tumor and tumor like lesions*: hemangioma, lymphangioma congenital epulis |

## *Oral & Dental*

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| Diagnosis | Be able to:<br>Select appropriate microbiological or radiological investigations to formulate a differential diagnosis |
| Management | Understand the principles of therapy for oral lesions and tumors<br>Know when consultation and/or referral is appropriate<br>Be able to:<br>Refer potentially serious oral tumors appropriately<br>Manage common oral tissue lesions |
| Gingivitis | |
| History | Know risk factors for the development of gingivitis (eg, lack of or poor oral hygiene) |
| Physical | Be able to:<br>Perform an oral examination including gingival health |
| Diagnosis | Be able to:<br>Recognize gingivitis<br>Differentiate gingivitis from other infectious diseases |
| Management | Be able to:<br>Recommend oral hygiene protocols<br>Refer to a dentist appropriately |

| **Dental problems**<br>By the end of training, a resident should: | |
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| Dental caries, dental erosions; developmental defects | |
| History | Know the risk factors for the development of caries and dental erosions (eg, diet and beverages, chronic diseases, |

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| | eating disorders, and bruxism)<br>Be able to:<br>Identify a history of pain and discomfort due to infection and/or abscess formation |
| Physical | Know the stages of caries lesion development<br>Be able to:<br>Perform an oral examination including teeth<br>Recognize developmental defects affecting dental tissues (ie, enamel and dentin) |
| Diagnosis | Be able to:<br>Recognize caries lesions that need dental treatment<br>Recognize initial caries lesions (white spots) that need only preventive intervention (eg, fluorides, oral hygiene, diet counseling)<br>Differentiate caries lesions from exogenous brown/black pigmentation of the teeth<br>Identify chronic diseases that may be associated with dental erosion (eg, gastroesophangyal reflux, asthma, and eating disorders) |
| Management | Be able to:<br>Perform a caries risk assessment<br>Provide recommendations in cases of chronic health conditions<br>Perform anticipatory guidance focused on oral health during well child visits (eg, information of the impact of diet on dental health and counseling in regard to oral hygiene, non-nutritive oral habits and dental safety, optimized fluoride exposure)<br>Refer to a dentist appropriately |
| Dental trauma | |

## *Oral & Dental*

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| History | Know the risk factors for trauma occurrence<br>Be able to:<br>Identify when, where, and how the trauma occurred<br>Identify features in the history that suggest the trauma may be non accidental |
| Physical | Be able to:<br>Perform a dental examination<br>Identify any associated traumatic lesions |
| Diagnosis | Be able to:<br>Identify and describe dental trauma from the history and physical examination |
| Management | Be able to:<br>Replant a permanent tooth in case of tooth avulsion<br>Refer all trauma cases as soon as possible to a dentist |

| **Congenital anomalies (natal and neonatal teeth, maxillary lip frenulum, ankyloglossia)**<br>By the end of training, the resident should: | |
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| History | Know the time of eruption of natal and neonatal teeth (ie, natal is present at birth, neonatal erupts within 30 days from birth) |
| Physical | Be able to:<br>Identify natal/neonatal tooth mobility<br>Identify an abnormal frenulum (maxillary or lingual) |
| Diagnosis | Be able to:<br>Determine when a natal or neonatal tooth should be removed |

## *Oral & Dental*

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| Management | Know that treatment is rarely required for an upper lip or lingual frenulum<br>Know that ankyloglossia though often benign can be a of cause feeding and oral hygiene difficulties or speech impairment<br>Be able to:<br>Refer to a dentist those with congenital teeth anomalies<br>Identify if nursing mother can adequately establish breast feeding if the baby has congenital abnormalities of mouth or teeth<br>Refer to a dentist or oral surgeon those in whom an abnormal frenulum is causing symptoms |
| Cleft lip, cleft palate | |
| History | Recognize the clinical problems associated with cleft palate in children (eg, feeding, speech, dental, hearing, middle ear disease)<br>Know that middle ear effusion is almost universally present in children with cleft palate<br>Know that submucous cleft and recurrent or chronic otitis media can be associated with cleft palate<br>Know that cleft palate deformities may be associated with chromosomal disorders and other abnormalities (eg, skeletal, craniofacial, eye) |
| Physical | Be able to:<br>Perform an appropriate physical examination of the oral cavity |
| Diagnosis | Be able to:<br>Formulate a diagnosis from the history and physical examination |
| Management | Know how to effectively collaborate with specialists and the family in treating these conditions<br>Be able to:<br>Plan a feeding program for a newborn with a cleft palate and/or a cleft lip |

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| | Recognize the association and management of mandibular hypoplasia with upper airway obstruction (eg, Pierre Robin syndrome) |

# *Otolaryngology*

| **General**<br>By the end of training, the resident should: | |
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| History | Be familiar with the common disorders of the ENT system |
| Physical | Be able to:<br>Recognize the congenital anomalies and the syndromes associated with the ENT system |
| Diagnosis | Be familiar with the diagnostic approaches in the field of ENT |
| Management | Be able to:<br>Provide effective collaborative care with patient, family, and specialists as appropriate |

| **Ears**<br>By the end of training, the resident should: | |
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| Congenital malformations | |
| History | Be able to:<br>Obtain family history regarding congenital anomalies and the syndromes associated with the ear |
| Physical | Be able to:<br>Identify any associated abnormalities (eg, renal anomalies, craniofacial malformations, and inner ear malformations)<br>Identify any known syndromes associated with congenital ear anomalies (eg, Goldenhaars, branchio-oto-renal syndrome) |
| Diagnosis | Be able to:<br>Order appropriate imaging and other laboratory studies in order to establish the diagnosis<br>Formulate a differential diagnosis |

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| Management | Be able to:<br>Make appropriate referral and collaborate with specialists |
| External ear (otitis externa, foreign body, haematoma) | |
| History | Know the pathogenesis and microbiology of otitis externa<br>Know the relationship between frequent swimming and otitis externa |
| Physical | Be able to:<br>Perform the appropriate examination of the external ear including cleaning the external ear<br>Recognize a foreign body in the external ear canal |
| Diagnosis | Be able to:<br>Develop a differential diagnosis of otitis externa<br>Diagnose hematoma of the external ear |
| Management | Be able to:<br>Prescribe appropriate prophylaxis for children with otitis externa who swim frequently<br>Initiate treatment for otitis externa<br>Initiate treatment for a hematoma of the external ear |
| Middle ear | |
| Acute and recurrent otitis media (AOM) | |
| History | Know the risk factors for, and common causes and complications of, otitis media<br>Know that otitis media is common in infants fed with propped bottles<br>Know the microbiology of acute otitis media at all ages in your locality including the prevalence of beta-lactamase-producing bacteria and non-typeable Hemophilus influenza |

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| | Know that the bacteriology of bullous myringitis is the same as acute otitis media<br>Understand the pathogenesis of acute otitis media (ie, the proposed primary role of eustachian tube dysfunction in causing middle ear disease)<br>Know the epidemiology of acute otitis media such as age of onset and peak season<br>Know that the initial occurrence of otitis media within the first 2 years of life places an infant at increased risk of recurrent or chronic middle ear disease<br>Know that recurrent otitis media may be associated with underlying conditions (eg, sinus disease, immunodeficiency, primary ciliary dyskinesia, dysmotile cilia syndrome, cleft palate)<br>Be able to:<br>Identify a child at risk of, or who is likely to have, otitis media from the history |
| Physical | Be able to:<br>Identify an abnormal ear drum |
| Diagnosis | Know that pneumatic otoscopy is the preferred generally available method of diagnosing middle ear effusion because diminished tympanic membrane mobility usually accompanies middle ear effusion<br>Know that cholesteatoma as a complication of otitis media<br>Be able to:<br>Identify the clinical manifestations of acute otitis media (eg, fever may or may not be present, otalgia, non-specific symptoms such as irritability) |
| Management | Know that AOM may not require antibiotic therapy, especially in children over 2 years of age<br>Know the appropriate antibiotic treatment options for AOM<br>Know the common indications for changing antibiotic therapy during acute otitis media (ie, persistent or recurrent |

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| | ear pain or fever after two to three days of therapy; the development of a suppurative complication )<br>Know that effusion may persist for 2 to 3 months or longer following acute otitis media<br>Know that acute otitis media may resolve without antibiotic therapy<br>Know that acute otitis media in the first six weeks after birth requires careful evaluation and follow-up<br>Know that subsequent treatment with an antimicrobial drug effective against beta-lactamase-producing bacteria may be indicated after an initial course of high dose amoxicillin has failed<br>Know the indications for drainage procedures(tympanocentesis and/or myringotomy) during acute otitis media (eg, unsatisfactory response to therapy, immunocompromised, seriously ill, suppurative complications)<br>Know the potential complications of tympanocentesis and myringotomy<br>Know that antihistamines and decongestants as a treatment for acute otitis media, as they have no proven value<br>Know the role of follow-up visits for an episode of otitis media to document middle ear status (eg, the presence of recurrent or chronic middle ear disease)<br>Be able to:<br>Provide appropriate supportive and antimicrobial therapy when indicated for acute, persistent, or recurrent otitis media<br>Counsel parents on the causes and natural history of ear infections<br>Refer for audiologic evaluation when appropriate<br>Refer to an otolaryngologist as needed |
| Otitis media with effusion or serous otitis media, secretory otitis media, ‘glue ear’ (OME) | |
| History | Know the predisposing factors for otitis media with effusion in children (eg, age 4-6 years, male sex, cleft palate, adenoidal enlargement) |

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| | Know that otitis media with effusion is often asymptomatic<br>Know that hearing loss in young children with otitis media with effusion may be associated with delayed speech and language development<br>Be able to:<br>Detect features in the history that suggest hearing loss, including behavioural problems |
| Physical | Know the etiologies of diminished tympanic membrane mobility and that middle ear effusion is the most frequent cause<br>Be able to:<br>Recognize otitis media with effusion on otoscopic examination |
| Diagnosis | Be able to:<br>Coordinate a hearing assessment in children with otitis media with effusion lasting longer than 3 months or recurrent otitis media |
| Management | Understand that antihistamines and decongestants have no value in the resolution of effusion in infants and children with otitis media<br>Know the indications for myringotomy and insertion of ventilation tubes (grommets)<br>Be able to:<br>Plan the appropriate management of a child with otitis media with effusion<br>Refer to surgical specialists as appropriate<br>Advise parents of children with ventilation tubes (grommets) about water activities such as swimming |
| Chronic otitis media with otorrhea (chronic suppurative otitis media) | |
| History | Know the complications of middle ear disease (eg, perforation of the tympanic membrane, acquired cholesteatoma, |

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| | tympanomastoiditis, tympanosclerosis, CNS complications)<br>Be aware of the differences in presentation and the clinical consequences of tubotympanic perforation and attico-antral perforation<br>Be able to:<br>Obtain a thorough history of ear infections |
| Physical | Be able to:<br>Thoroughly inspect the ear, evaluating for possible disease |
| Diagnosis | Know the different organisms causing otitis media with otorrhea (eg, Pseudomonas, Staphylococcus) |
| Management | Know the indications for surgical referral for myringoplasty or mastoid surgery<br>Be able to:<br>Plan the management of chronic otitis media with otorrhea<br>Refer to a specialist when indicated |
| Other (Otologia, otorrhea) | |
| History | Know the etiology of referred pain to the ear (eg, temporomandibular joint dysfunction, tooth pain, pharyngitis)<br>Know that persistent watery otorrhea may be cerebrospinal fluid leakage<br>Know the etiologies of purulent or bloody ear drainage |
| Physical | Be able to:<br>Detect signs of temporomandibular tenderness, pharngitis or dental disease that may produce pain in the ear |
| Diagnosis | Be able to:<br>Formulate a differential diagnosis of ear pain or discharge |

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| Management | Be able to:<br>Develop a management plan for ear pain or discharge |
| Inner ear | |
| History | Know that the inner ear may be affected by viral or bacterial infections (eg, rubella, cytomegalovirus, mumps) as well as a post infectious response |
| Physical | Be able to:<br>Recognize the clinical presentation of benign paroxysmal vertigo |
| Diagnosis | Be able to:<br>Formulate the differential diagnosis of balance disturbance in children<br>Refer appropriately to a specialist |
| Deafness and hearing loss | |
| History | Know the conditions that contribute to conductive and/or sensorineural hearing loss in children<br><u>CONDUCTIVE HEARING LOSS:</u><br>Know the clinical presentations of a mild conductive hearing loss (ie, they may be subtle and may present as ignoring behavior, increasing the television volume)<br>Know that temporary conductive hearing loss occurs with Acute Otitis Media and with Otitis Media with Effusion<br><u>SENSORINEURAL HEARING LOSS:</u><br>Know the neonatal risk factors for a sensorineural hearing impairment (eg, hyperbilirubinemia, infection, craniofacial deformities, family history,low birth weight, prolonged ventilation, ototoxic drugs)<br>Know which commonly used pediatric drugs might produce sensorineural hearing loss<br>Know that acoustic trauma produces high-frequency hearing loss |

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| | Know that exposure to persistent loud noise (eg, listening to loud music with earbuds) can produce high frequency sensorineural hearing loss<br>Know the inherited conditions associated with progressive sensorineural hearing loss<br>Be able to:<br>Detect warning signs from the history that a child may have a hearing impairment<br>Elicit any risk factors that may have pre-disposed to the development of hearing loss |
| Physical | Be able to:<br>Perform tympanometry and interpret the various functions it measures<br>Understand the techniques for hearing evaluation at different ages<br>Evaluate the auditory system in children of all ages |
| Diagnosis | Understand that tympanometry can be a useful clinical adjunct (eg, detection of perforation, assessment of patency of tympanostomy tubes)<br>Know that hearing screening should be performed on all neonates<br>Know the limitations of screening audiometry<br>Know that tympanometric findings may be normal in the presence of a sensorineural hearing loss and other pathology<br>Be able to:<br>Formulate the differential diagnosis of acquired hearing disturbances and loss |
| Management | Know that hearing loss in children with bacterial meningitis occurs and that audiologic follow-up is indicated<br>Be able to: |

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| | Refer appropriately to a specialist when a patient has a conductive and/or sensorineural hearing loss |
| Mastoiditis | |
| History | Know that mastoiditis can be a complication of otitis media<br>Know the microbiology of mastoiditis |
| Physical | Be able to:<br>Identify the clinical manifestations of acute mastoiditis |
| Diagnosis | Be able to:<br>Order the appropriate laboratory evaluation of mastoiditis including imaging and culture of the middle ear effusion or possible surgical drainage<br>Formulate the diagnosis of mastoiditis |
| Management | Be able to:<br>Refer to a specialist for suspected mastoiditis |

| **Nose and nasopharynx**<br>By the end of training, the resident should: | |
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| Choanal atresia | |
| History | Understand the association of choanal atresia and other congenital anomalies |
| Physical | Know how to evaluate a child with suspected choanal atresia<br>Be able to:<br>Recognize the signs of choanal atresia |
| Diagnosis | Understand that timely diagnosis may be lifesaving |

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| Management | Be able to:<br>Establish a secure open airway in cases of suspected choanal atresia<br>Refer to a specialist for further management |
| Epistaxis | |
| History | Know causes of epistaxis<br>Know when to investigate for coagulopathy in cases of epistaxis |
| Physical | Be able to:<br>Evaluate a child with epistaxis |
| Diagnosis | Be able to:<br>Formulate a differential diagnosis for epistaxis |
| Management | Be able to:<br>Apply techniques to control acute epistaxis<br>Refer to a specialist appropriately |
| Rhinitis | |
| General | |
| History | Know that most neonates are predominantly nasal breathers<br>Know the common causes of rhinitis<br>Know that nasal congestion in adolescents may be associated with use of illicit inhaled drugs<br>Be able to:<br>Elicit from the history any precipitating causes of rhinitis |

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| Physical | Be able to:<br>Perform a thorough physical examination of the nose |
| Diagnosis | Be able to:<br>Formulate a differential diagnosis for a patient who has chronic rhinitis (e.g., allergy, sinusitis, polyps, cystic fibrosis, foreign body) |
| Management | Understand the complications of using topical decongestants in children<br>Be able to:<br>Formulate an appropriate management plan for a child with acute and chronic rhinitis |
| Allergic rhinitis (see also ***Allergy***) | |
| History | Be able to:<br>Obtain a history of allergies in the child and a family history of allergies<br>Elicit from the history likely allergens causing the symptoms |
| Physical | Be able to:<br>Complete an appropriate physical examination of the nasopharynx |
| Diagnosis | Be able to:<br>Distinguish between allergic rhinitis and non-allergic rhinitis<br>Perform appropriate tests in order to formulate a diagnosis |
| Management | Know the supportive treatment is generally the only treatment needed<br>Be able to:<br>Provide appropriate treatment of allergic rhinitis |

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| Infectious rhinitis | |
| History | Know that group A streptococcal infection can present as protracted nasopharyngitis in infants and younger children (ages 1-3 yrs) |
| Physical | Be able to:<br>Perform a routine respiratory and ENT physical |
| Diagnosis | Be able to:<br>Utilize appropriate laboratory studies to confirm diagnosis |
| Management | Know that oral decongestants and antihistamines are not recommended for young children<br>Be able to:<br>Provide appropriate supportive treatment |
| Nasal Polyps | |
| History | Know the conditions associated with nasal polyps in children (eg, cystic fibrosis, asthma, chronic allergic rhinitis, chronic sinusitis) |
| Physical | Be able to:<br>Identify nasal polyps on examination |
| Diagnosis | Know that nasals polyps may be a sign of cystic fibrosis even in the absence of failure to thrive, pulmonary, and digestive tract symptomatology<br>Be able to:<br>Formulate the diagnosis of nasal polyps<br>Select appropriate investigations (eg a sweat test) if indicated |
| Management | Be able to: |

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| | Refer to a specialist as appropriate |
| Common cold | |
| History | Understand the epidemiology of the common cold and that symptoms can last at least 14 days<br>Know the microbiology of the common cold (viral etiology)<br>Know that common colds are a frequent trigger for asthma in children |
| Physical | Be able to:<br>Perform a routine ENT physical |
| Diagnosis | Be able to:<br>Exclude other conditions causing similar symptoms |
| Management | Know that treatment is supportive and that over the counter medications are not indicated<br>Be able to:<br>Advise families appropriately on supportive management |
| Trauma or Foreign Body | |
| History | Know that unilateral foul-smelling nasal discharge from the side of the nose in which the foreign body is embedded is common |
| Physical | Know the significance of a hematoma of the nasal septum<br>Be able to:<br>Identify a hematoma if present<br>Identify a nasal foreign body |
| Diagnosis | Be able to:<br>Make the diagnosis from the history and physical examination |

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| Management | Know the appropriate management of a foreign body<br>Be able to:<br>Refer to a specialist as appropriate |
| Adenoidal hypertrophy | |
| History | Know the natural history of adenoidal hypertrophy<br>Be able to:<br>Elicit symptoms that a child has airways obstruction from adenoidal hypertrophy (eg, chronic mouth breathing, obstructive sleep apnea, fatigue associated with sleep deprivation, cor pulmonale) |
| Physical | Be able to:<br>Perform a physical examination to inspect the anterior nasal airway |
| Diagnosis | Understand the use and limitations of a lateral soft tissue x-ray in the evaluation of adenoidal hypertrophy<br>Understand the use of sleep study monitoring |
| Management | Know the indications for an adenoidectomy<br>Be able to:<br>Refer to a specialist appropriately |
| Tonsillar enlargement | |
| History | Know the natural history of tonsillar enlargement<br>Be able to:<br>Elicit from the history evidence that tonsillar enlargement is causing airways obstruction (eg, snoring, chronic mouth breathing, obstructive sleep apnoea, daytime drowsiness, inattentive behavior) |
| Physical | Be able to: |

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| | Identify tonsillar hypertrophy |
| Diagnosis | Understand the use and limitations of investigations to determine airways obstruction from tonsillar enlargement (eg, soft tissue Xray of the neck, sleep study monitoring) |
| Management | Know the indications for tonsillectomy<br>Be able to<br>Refer to a specialist appropriately |

| **Sinusitis (acute and chronic)**<br>By the end of training, the resident should: | |
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| History | Know the etiology, pathogenesis, and epidemiology of acute and chronic sinusitis<br>Know the natural history of the development of the maxillary, ethmoid, and frontal sinuses and the ages at which sinusitis is more likely to occur<br>Understand the potential seriousness of spreading infection<br>Be able to:<br>Elicit symptoms suggestive of maxillary sinusitis(eg, purulent catarrh, headache, fever)<br>Elicit symptoms suggestive of ethmoiditis (eg, frontal headache, pain around the eye, peri-orbiatal swelling,nasal discharge and headache)<br>Elicit symptoms suggestive of frontal sinusitis (eg, headache fever but minimal nasal discharge) |
| Physical | Be able to:<br>Identify signs of sinusitis (eg, pain on palpation over sinus, orbital swelling , nasal discharge) |
| Diagnosis | Be able to: |

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| | Formulate the diagnosis including using radiologic imaging if indicated |
| Management | Know the indications for the use of antibiotics and understand that most cases of sinusitis in children do not require treatment with antibiotics<br>Understand the potential serious consequences of ethmoiditis and frontal sinusitis<br>Be able to:<br>Formulate a management plan for all types of sinusitis<br>Prescribe appropriate antibiotics when indicated<br>Refer to specialists when appropriate |

| **Pharynx**<br>Be the end of training, the resident should: | |
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| Tonsillitis | |
| History | Know the infectious agents responsible for acute tonsillitis<br>Know the complications of Group A hemolytic streptococcus (GABHS) such as otitis media, sinusitis, and peritonsillar abscess<br>Know that Diphtheria can affect the non-immunized patient<br>Be able to<br>Elicit the symptoms common to pharyngotonsillitis<br>Take a detailed history of fluid intake in a child suspected of having acute tonsillitis |
| Physical | Be able to:<br>Elicit the signs of acute tonsillitis |

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| Diagnosis | Understand the use, and limitations of, investigations to determine the cause of tonsillitis<br>Be able to:<br>Take a throat swab to identify tonsillar infection if indicated<br>Formulate the differential diagnosis of a child with pharyngotonsillitis |
| Management | Know the potential complications of untreated GABHS (eg, rheumatic fever and glomerulonephritis)<br>Know that most cases of non-GABHS pharyngotonsillitis do not require treatment with antibiotics<br>Know that a child with a persistent positive throat culture for group A streptococcus, who is still symptomatic following appropriate treatment, requires reculture and treatment<br>Know that a culture for group A streptococcus may not be positive until 48-72h after completion of an antibiotic<br>Be able to:<br>Develop a management plan for a child with acute tonsillitis<br>Prescribe appropriate antibiotic treatment for GABHS pharyngotonsillitis<br>Refer appropriately for tonsillectomy |
| Peritonsillar abscess | |
| History | Know that peritonsillar abscess is usually associated with polymicrobial infection<br>Know that peritonsillar abscess usually occurs during or just after an attack of tonsillitis<br>Be able to:<br>Elicit symptoms suggestive of peritonsillar abscess (eg, increasing pain and swelling, usually unilateral, dysphagia, and otalgia) |
| Physical | Be aware that trismus may make examination difficult |

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| Diagnosis | Be able to:<br>Differentiate between tonsillitis and peritonsillar abscess |
| Management | Be able to:<br>Refer to a specialist appropriately |
| Retropharyngeal abscess | |
| History | Know the microbiology of retropharyngeal abscess in children |
| Physical | Be able to:<br>Identify the clinical manifestations of retropharyngeal abscess in children |
| Diagnosis | Be able to:<br>Order appropriate imaging studies to aid in the diagnosis of retro-pharyngeal abscess in children |
| Management | Be able to:<br>Refer to a specialist for treatment |

| **Mouth and oropharynx** *(*see also ***Oral and Dental)***<br>By the end of training, the resident should: | |
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| Tongue, oral cavity, uvula, salivary glands | |
| History | Know that most children with a short lingual frenulum require no treatment<br>Know the causes of parotitis<br>Know that a bifid uvula is associated with submucous cleft palate and middle ear effusion |
| Physical | Be able to:<br>Conduct an appropriate examination of the mouth and oropharynx |

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| Diagnosis | Be able to:<br>Formulate the differential diagnosis of preauricular swelling (eg, parotitis, lymphadenitis, tumor, lymphosarcoma)<br>Distinguish clinically between hand-foot-and-mouth disease, herpangina, acute herpetic gingivostomatitis, and aphthous lesions |
| Management | Be able to:<br>Implement appropriate treatment for conditions involving the tongue, uvula, oral mucosa, and salivary glands |

| **Larynx**<br>By the end of training, the resident should: | |
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| Laryngomalacia | |
| History | Be able to:<br>Elicit the symptoms suggestive of laryngomalacia (eg, isolated stridor in an otherwise healthy infant) |
| Physical | Be able to:<br>Identify the clinical signs of laryngomalacia |
| Diagnosis | Be able to:<br>Distinguish between laryngomalacia and other causes of stridor<br>Rule out more serious diagnoses such as vascular ring or tumors |
| Management | Be able to:<br>Counsel parents on the natural history of larngomalacia |

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| | Refer to specialists as appropriate<br>Provide supportive therapy as appropriate |
| Laryngitis | |
| History | Know that hoarseness may follow endotracheal extubation in children<br>Know that laryngitis is usually associated with viruses |
| Physical | Be able to:<br>Perform an appropriate examination of the larynx |
| Diagnosis | Be able to:<br>Formulate a differential diagnosis of hoarseness and rule out other disorders/diseases |
| Management | Be able to:<br>Institute the appropriate treatment for laryngitis |
| Croup, Laryngotracheobronchitis | |
| History | Know the organisms most commonly causing croup<br>Be able to:<br>Elicit the symptoms suggestive of croup (eg, inspiratory stridor often noticed at night and worse when the child is distressed preceded by coryzal symptoms)<br>Elicit any predisposing features (eg, those with pre existing sub-glottic stenosis) |
| Physical | Be able to:<br>Identify the typical clinical signs of croup<br>Identify signs of severity (eg, hypoxemia, restlessness, subcostal and intercostal recession not of the intensity of stridor) |

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| Diagnosis | Know that this is a clinical diagnosis and does not require neck radiography<br>Be able to:<br>Distinguish between viral and non-infectious croup<br>Differentiate croup from epiglottitis and laryngotraceitis |
| Management | Know that the decision to admit to hospital is based on clinical features and severity of croup<br>Understand the use of croup scores<br>Know the advantages and disadvantages of nebulized epinephrine (adrenaline)<br>Be able to:<br>Provide reassurance and support to parents of children with mild croup<br>Prescribe steroids as appropriate (oral, nebulized, or intramuscular) in more severe croup<br>Prescribe nebulized epinephrine for short term benefit if indicated |
| Foreign bodies | |
| History | Know that most patients who ingest foreign bodies are under age 3<br>Be able to:<br>Elicit a history suggestive of inhalation of a foreign body (eg, initial choking or coughing after foreign body ingestion is often followed by an asymptomatic period) |
| Physical | Be able to:<br>Perform an appropriate physical examination including lung auscultation |
| Diagnosis | Be able to:<br>Utilize appropriate diagnostic tools in making the diagnosis |

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| Management | Be able to:<br>Refer appropriately to a specialist |
| Epiglottitis | |
| History | Know that epiglottitis is a potentially lethal condition<br>Understand the clinical course<br>Know that Hib vaccination does not exclude the diagnosis due to sporadic cases of vaccine failure |
| Physical | Know the risks of examination of patients with suspected epiglottitis<br>Be able to:<br>Identify physical signs on observation suggestive of epiglottitis (toxic, upright position, drooling) |
| Diagnosis | Know that the diagnosis is made on clinical grounds<br>Be able to:<br>Differentiate viral croup from those of epiglottitis and bacterial tracheitis |
| Management | Know that airway management always takes priority<br>Know the appropriate antibiotic treatment for epiglottitis<br>Be able to:<br>Activate an appropriate management plan including early involvement of specialists (anesthesiology,otolaryngology) |

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| **Neck**<br>By the end of training, the resident should: |
| Cervical adenopathy |

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| History | Know the causes of acute and chronic cervical lymphadenopathy<br>Know the microbiology of acute cervical lymphadenitis |
| Physical | Be able to:<br>Detect enlarged cervical glands<br>Perform a thorough physical examination to detect any other lymphadenopathy or hepatosplnomegaly |
| Diagnosis | Be able to:<br>Formulate a differential diagnosis of cervical lymphadenopathy with respect to location, presence or absence of generalized lymphadenopathy, and presence or absence of systemic features |
| Management | Know that S. aureus is an important cause of acute cervical lymphadenitis in infants and that surgical drainage may be necessary<br>Be able to:<br>Formulate a treatment plan for cervical adenopathy and acute cervical lymphadenitis<br>Refer to specialists if appropriate |
| Other neck masses | |
| History | Know the causes of neck masses not associated with enlarged cervical lymph nodes (eg, thyroglossal duct cysts, cystic hygroma, branchial cleft cysts, enlarged thyroid, thyroid masses) |
| Physical | Be able to:<br>Perform an appropriate examination of the neck for masses |
| Diagnosis | Be able to:<br>Formulate the differential diagnosis of neck masses based upon history and physical examination findings<br>Utilize appropriate diagnostic tests to evaluate neck masses |

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| Management | Know the appropriate treatment for neck masses<br>Be able to:<br>Refer to specialists when appropriate |

## *Pharmacology*

| **General Pharmacodynamics (ie, absorption and systemic availability; interpretation of drug concentrations; adverse drug reactions; drug interactions; pharmacogenetics)**<br>By the end of training, the resident should: | |
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| History | Have a basic knowledge of off-label and unlicensed drugs<br>Understand non-adherence as the major factor when drug concentrations or drug actions are highly variable in an adolescent<br>Know that a drug allergy and rash may be idiosyncratic reactions<br>Understand the major pathways of drug metabolism in pediatric patients of different ages<br>Understand which drugs stimulate or inhibit hepatic metabolism<br>Understand the association between half-life, therapeutic range, and drug toxicity<br>Be able to:<br>Locate product names (brand, generic, chemical) and ingredients, as well as concentrations from patient and/or labels |
| Physical | Be able to:<br>Gather correct age and weight in order to refine estimates of dosage |
| Diagnosis | Be able to:<br>Plan the appropriate timing for measurement of serum drug concentrations<br>Distinguish between dose-related and idiosyncratic drug effects |
| Management | Know the pharmacokinetics and pharmacodynamics of commonly prescribed drugs<br>Know about the drug interactions of commonly used drugs and complementary therapies<br>Understand the role of reporting adverse drug reactions<br>Know the risks of prescribing in the child-bearing years, in pregnancy and breast feeding mothers |

## *Pharmacology*

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| | Know which drugs should be taken with food or which should be taken on an empty stomach<br>Know factors which influence bioequivalence (eg, brand name vs. generic drugs)<br>Understand placental transfer and breast milk excretion of drugs<br>Understand the cost and efficacy of drug use<br>Understand factors affecting compliance<br>Understand analgesia and safe sedation for procedures<br>Understand the influence of drug metabolism, drug excretion, or route administration on drug pharmacokinetics<br>Know that concomitant administration of certain drugs can alter concentrations of other drugs in the patient's regimen<br>Know about common complementary and alternative therapies and where to find out about them so an informed and safe choice about treatment can be made<br>Understand the potential for interactions between drugs and alternative therapies (eg, herbs)<br>Be aware of the most frequent types of medication error associates with drug prescribing for children (eg, incorrect strength, duplicate dose, incorrect rate)<br>Be able to:<br>Respond appropriately to errors of prescription or administration and be able to talk to parents about errors<br>Recognize serious drug reactions (eg, Stevens-Johnson Syndrome)<br>Prescribe safely for the newborns, children, and breast feeding mothers<br>Prescribe safely for children with renal or liver failure<br>Calculate dosages accurately based on weight, age, and/or body surface area<br>Gather information necessary for prescribing through use of pediatric formularies and pharmacy consultation<br>Explain to parents how to properly administer medicine |

| **Specific drug classes** |
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## *Pharmacology*

| **General Issues**<br>By the end of training, the resident should: | |
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| Antibiotics | |
| | Know the antibiotics that are active against broad categories of bacteria<br>Know common antibiotic resistance patterns in your locality<br>Be able to:<br>Recognize serious adverse affects to medications (eg, hypersensitive reaction, Stevens-Johnson syndrome, serum sickness)<br>Recognize the adverse effects associated with the use of various antibiotics<br>Recognize the association of pseudomembranous colitis with antibiotic therapy<br>Recognize serum sickness reaction<br>Prescribe appropriately antibiotics for antimicrobial prophylaxis (eg, urinary tract infection or to protect against endocarditis)<br>Prescribe appropriate antibiotics for infections prior to sensitivities being available |
| Diuretics | |
| | Know the long term side effects of diuretics (eg, Calculi)<br>Be able to:<br>Differentiate the effects of various diuretic drugs on calcium excretion<br>Identify ototoxicity and nephrotoxicity as potential adverse dose-related effects of furosemide |
| Corticosteroids | |
| | Know the special risks for chronically corticosteroid-dependent children (eg, growth retardation, pathologic fractures, immunosuppression, cataracts, diabetes)<br>Be able to:<br>Manage a corticosteroid dependant patient during times of stress including surgery and acute infections |
| Immunosuppressants | |

## *Pharmacology*

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| | Know the long-term risks of chronic immunosuppression |
| Beta-blocking drugs | |
| | Know common side effects of beta-blocking drugs<br>Understand that patients with asthma may not be able to tolerate Beta-blocking drugs |
| Anti-inflammatory drugs | |
| | Know the risks associated with the use of aspirin<br>Know the common side effects associated with the use of non-steroidal anti-inflammatory drugs |
| H2-blocking drugs | |
| | Know the side effects of H-2 blocking drugs |
| Beta-agonists | |
| | Understand the pharmacokinetics of short- and long-acting inhaled beta-agonists and the risks associated with their excessive use<br>Understand the phenomenon of tachyphylaxis |
| Anti-hypertensives | |
| | Know the acute and chronic side effects of anti-hypertensive drugs |
| Anticonvulsants | |
| History | Know the side effects and toxicities associated with anticonvulsant drugs<br>Know laboratory abnormalities associated with anticonvulsant therapy |
| Antidepressant and stimulant drugs | |
| | Understand the risks associated with the use of various antidepressant drugs<br>Understand the common side effects of medications used to treat attention deficit hyperactivity disorder |

| **Pain management and Sedation**<br>By the end of training, the resident should: |
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| Sedation |

## *Pharmacology*

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| History | Understand the definition of procedural sedation as opposed to deep sedation and general anesthesia |
| Physical | |
| Diagnosis | Understand what level of observation and monitoring is recommended for a patient undergoing procedural sedation |
| Management | Understand the indications and contraindications for moderate sedation<br>Understand there should be an appropriate interval of fasting before moderate sedation<br>Be able to:<br>Recognize side effects and signs and symptoms of an overdose of commonly prescribed sedatives<br>manage an overdose appropriately |
| Analgesia *(see also **Emergency Medical Care: Pain**)* | |
| History | Understand the mechanism of action of various narcotic and non-narcotic medications<br>Understand the risks associated with the use of narcotics for pain management |
| Physical | Be able to:<br>Distinguish true allergic reaction to opioid medications from side effects that are not true allergy (eg, flushing, itching, urticaria) |
| Diagnosis | Be aware of tools used to assess pain in children<br>Be able to:<br>Assess pain in children of various ages |
| Management | Understand the appropriate use of non-pharmacologic pain management modalities<br>Be able to:<br>Administer pain medication in a stepwise fashion using appropriate medications and routes of administration |

## *Respiratory*

| **General**<br>By the end of training the resident should: | |
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| History | Understand the effect of pulmonary disease on normal growth and development<br>Understand the perinatal, genetic and environmental factors that pre-dispose to the development of respiratory problems<br>Understand normal fetal and perinatal development of the respiratory system<br>Understand normal respiratory physiology and pathophysiology<br>Know the epidemiology of local respiratory pathogens<br>Know that exercise intolerance may be a presenting symptom of chronic lung diseases (eg, asthma, interstitial lung disease) but may also have a range of non-respiratory causes<br>Know that upper respiratory tract infection and airway obstruction in young infants lead to respiratory distress<br>Be able to:<br>Identify symptoms suggestive of acute and chronic respiratory disease<br>Identify predisposing factors to the development of respiratory disease, biological (eg, neuromuscular and skeletal disorders and immunodeficiency) and environmental (eg, infections, smoking)<br>Identify features in the presentation which suggest serious or unusual pathology |
| Physical | Know the disorders associated with clubbing<br>Be able to:<br>Perform a complete examination of the upper airway and lungs<br>Recognize signs indicating upper and lower airway disease<br>Detect clubbing |
| Diagnosis | When evaluating lower airway disease, know when chest radiography is and is not indicated<br>Be able to:<br>Perform and interpret basic lung function tests (eg, peak flow, spirometry)<br>Perform and interpret blood gas measurements |

## *Respiratory*

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| | Perform and interpret chest radiography<br>Utilize more complex radiological investigations (eg, ventilation perfusion scans, CT scan, video-fluroscopy) consulting a specialist when necessary<br>Refer appropriately children needing bronchoscopy for diagnostic evaluation<br>Effectively use a range of diagnostic studies to evaluate a child with an undifferentiated respiratory ailment |
| Management | Be able to:<br>Assess and initiate management of patients presenting with respiratory problems in acute and outpatient settings<br>Undertake long term management of some chronic respiratory problems<br>Consult with specialists effectively |

| **General signs and symptoms (including distress and severe respiratory distress)**<br>By the end of training the resident should: | |
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| Stridor | |
| History | Know the causes of acute and chronic stridor in children of different ages (eg, infection, laryngo-tracheo-bronchomalacia, subglottic stenosis, vocal cord paralysis, subglottic hemangiomata)<br>Know the importance of a history of previous endotracheal intubation<br>Understand the potentially life-threatening nature of acute stridor<br>Be able to:<br>Elicit factors in the history that may predispose to, or be the cause of, stridor<br>Identify children with existing chronic upper airway problems |
| Physical | Be able to distinguish between upper and lower airway obstruction |
| Diagnosis | Be able to:<br>Formulate the differential diagnosis of congenital stridor, acute and chronic stridor<br>Appropriately utilize endoscopy as the diagnostic tool of choice for laryngeal and vocal cord disorders |

## *Respiratory*

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| Management | Be able to:<br>Identify those causes of stridor that require specialty referral<br>Plan the appropriate management for stridor of various etiologies |
| Respiratory failure | |
| History | Know the parameters of respiratory failure |
| Physical | Be able to:<br>Recognize the manifestations of chronic hypoxemia: polycythemia, pulmonary hypertension, cor pulmonale<br>Recognize the clinical manifestations of acute hypercapnia: flushing, agitation, confusion, tachycardia, headache |
| Diagnosis | Be able to:<br>Recognize the combination of arterial blood gas values that indicate chronic carbon dioxide retention (eg, increased PCO2, normal pH, increased serum bicarbonate concentration, increased base excess)<br>Recognize the arterial blood gas values associated with acute respiratory failure in a normal child as well as one with chronic respiratory failure |
| Management | Know the potential risks and benefits of administering oxygen to children with chronic respiratory failure<br>Understand the indications for mechanical ventilation and non-invasive forms of assisted ventilation<br>Be able to:<br>Initiate treatment, including assisted ventilation, for a child with acute respiratory failure<br>Consult with other pediatricians, anesthetists, and intensivists when appropriate |
| Cough (acute and chronic) | |
| History | Know that cough is a major, and at times the only, manifestation of asthma<br>Know which conditions impair the effectiveness of cough (eg, cerebral palsy, muscle weakness, vocal cord dysfunction, CNS disease, thoracic deformities, pain)<br>Be able to elicit features in the history that suggest that a cough may be psychogenic rather than indicative of respiratory pathology |

## *Respiratory*

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| Physical | Be able to elicit physical signs that may accompany cough (eg, wheeze, decreased breath sounds) |
| Diagnosis | Be able to:<br>Formulate the differential diagnosis of chronic cough in children of different ages<br>Plan the initial screening evaluation of a chronic cough |
| Management | Understand the limited indications for cough suppressants<br>Be able to refer to a specialist a child who has a persistent cough unresponsive to treatment |
| Apnea (for Neonatal Apnea see ***Critical Care in Neonates: Apnea***, for Sleep Apnea see ***Rehabilitation: Sleep Related Disorders***) | |
| Wheezing (see also ***Asthma***) | |
| History | Know the causes of wheezing (eg asthma, respiratory infection, vocal cord dysfunction, tracheomalacia, respiratory tract obstruction due to external compression, foreign body)<br>Be able to elicit an accurate history of the onset, timing, duration and precipitating factors associated with wheezing |
| Physical | Be aware that the absence of wheezing does not preclude lower airway obstruction<br>Know that the expiratory phase of respiration is often prolonged in lower airway obstruction<br>Be able to identify true wheezing on physical examination |
| Diagnosis | Know that persistent wheezing unresponsive to bronchodilators or unilateral wheezing is an important indication for bronchoscopy<br>Be able to:<br>Develop a differential diagnosis of recurrent or persistent wheezing<br>Plan the appropriate clinical and diagnostic evaluation of wheezing of various etiologies |
| Management | Be able to plan the appropriate management for wheezing of various etiologies |
| Tachypnea | |
| History | Know the normal respiratory rates for age and the variations that occur with sleep, eating, and activity in normal children<br>Know the non-pulmonary causes of tachypnea |
| Physical | Be able to: |

## *Respiratory*

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| | Identify abnormal respiratory rates in children of varying ages<br>Identify any associated respiratory signs (eg, recession, wheeze) |
| Diagnosis | Be able to:<br>Formulate a differential diagnosis in a child with a raised respiratory rate<br>Plan the appropriate diagnostic evaluation of a child with tachypnea of various etiologies |
| Management | Be able to plan the management of tachypnea according to the cause |
| Hemoptysis | |
| History | Know that hemoptysis is unusual in children<br>Know that hemosiderosis is associated with hemoptysis<br>Be able to assess severity of hemoptysis based on history |
| Physical | Be able to evaluate the upper airway including mouth and nose for bleeding sources |
| Diagnosis | Know the indications for bronchoscopy<br>Be able to formulate the differential diagnosis of hemoptysis in children of varying ages |
| Management | Be able to plan the initial management of hemoptysis in children and adolescents |
| Cyanosis (for non-respiratory cyanosis see ***Critical Care in Neonates*** and ***Cardiology***) | |
| History | Know that cyanosis is not a sensitive indicator of oxyhemoglobin desaturation<br>Know the common extrapulmonary causes of cyanosis: right-to-left shunt, methemoglobinemia, acrocyanosis |
| Physical | Know that different skin colors and races affect appearance of cyanosis<br>Be able to identify features that differentiate between central and peripheral cyanosis |
| Diagnosis | Be able to:<br>Measure and interpret peripheral oxygen saturation<br>Interpret blood gas analysis |
| Management | Know when oxygen therapy is appropriate<br>Be able to:<br>Initiate supportive treatment |

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| | Formulate a treatment plan according to the causes of cyanosis<br>Initiate appropriate consultations |
| Snoring or features of sleep obstruction | |
| History | Know the causes of snoring |
| Physical | Be able to recognize this condition and its complications |
| Diagnosis | Be able to initiate sleep studies appropriately when indicated |
| Management | Be able to refer appropriately to an ENT surgeon |

| **Upper airway** | |
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| Croup (see ***Otolaryngology***) | |
| Epiglottitis (see ***Otolaryngology***) | |
| Foreign body (see also ***Otolarngology***) | |
| History | Know the risk factors and age groups at risk for foreign body aspiration<br>Understand that foreign body aspiration may present with a variety of symptoms depending on the level of obstruction (eg, stridor, wheezing, chronic pneumonia)<br>Be able to elicit a history suggestive of inhalation of a foreign body (eg, initial choking or coughing after foreign body ingestion is often followed by an asymptomatic period) |
| Physical | Be able to perform an appropriate physical examination including lung auscultation |
| Diagnosis | Be able to utilize, and understand the shortcomings of, radiographic techniques to diagnose an aspirated foreign body |
| Management | Know the utility of fiber-optic and rigid bronchoscopy in the diagnosis and management of foreign body aspiration<br>Be able to:<br>Perform emergency airway clearance maneuvers<br>Refer appropriately to a specialist |
| Tracheomalacia (see also ***Otolaryngology: Laryngomalacia***) | |
| History | Know that tracheomalacia can occur as a complication of chronic mechanical ventilation in children |

## *Respiratory*

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| | Know that tracheoesophageal fistula may result in tracheomalacia<br>Know that severe malacia may present as ventilator dependency in the neonatal period<br>Know that those with milder involvement present with more non specific symptoms (eg, cough, recurrent infections, shortness of breath, wheeze, stridor) |
| Physical | Be able to recognize the clinical signs of tracheomalacia |
| Diagnosis | Be able to:<br>Distinguish between tracheomalacia and other causes of respiratory symptoms<br>Rule out more serious diagnoses, such as vascular ring or tumors |
| Management | Be able to:<br>Initiate appropriate management of tracheomalacia<br>Refer to specialists as appropriate |
| Trache-esophageal fistula (see ***Critical Care in Neonates***) | |
| Bacterial tracheitis | |
| History | Know the typical clinical course of bacterial tracheitis, including biphasic illness, precipitous worsening, requirement for intubation, and relatively prolonged intubation<br>Know the microbiology of bacterial tracheitis<br>Be able to elicit the symptoms of bacterial tracheitis |
| Physical | Be able to recognize the signs of bacterial tracheitis |
| Diagnosis | Know that definitive diagnosis is usually made at laryngoscopy<br>Be able to formulate the differential diagnosis for tracheitis |
| Management | Be able to:<br>Initiate the treatment of bacterial tracheitis<br>Provide supportive airway management<br>Consult with specialists as necessary |

## *Respiratory*

| **Lower airway** | |
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| Vascular abnormalities | |
| History | Be able to elicit the presenting symptoms of vascular airway anomalies (eg, stridor, wheezing, cugh, recurrent infections) |
| Physical | Know that there are usually no diagnostic physical findings |
| Diagnosis | Be able to use the diagnostic modalities that facilitate identification of vascular anomalies obstructing the airway (eg, barium swallow, echocardiography, MRI, CT scan) |
| Management | Be able to consult with specialists appropriately for indications and timing of surgery |
| Congenital malformations | |
| History | Be aware of the congenital malformations of the lung (eg, absence of lobe or lung, small lungs, cystic lungs)<br>Know the symptoms that may be caused by congenital malformations of the lung |
| Physical | |
| Diagnosis | Be familiar with the radiographic appearance of various congenital malformations of the lung |
| Management | Be able to appropriately refer children with congenital malformations of the lung for surgical intervention |
| Bronchiolitis (see also ***Infectious Diseases***) | |
| History | Know that although the majority are associated with respiratory syncitial virus a wide range of other viruses cause a similar clinical picture<br>Know factors that predispose to severe symptoms (eg, prematurity, cardiovascular disease, chronic respiratory disease, immunosuppression)<br>Be able to:<br>Elicit symptoms associated with bronchiolitis<br>Identify factors that may predispose to severe disease |
| Physical | Be able to:<br>Identify the clinical manifestations of bronchiolitis (eg, tachypnea, recession, crackles and wheeze)<br>Identify signs of severe illness (eg, apnea, listlessness, cyanosis, decreased level of consciousness) |
| Diagnosis | Know the uses and limitations of rapid antigen testing for viral pathogens |

## *Respiratory*

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| | Know that chest Xray is rarely helpful<br>Be able to make a diagnosis of bronchiolitis based on history and physical |
| Management | Know that bronchiolitis is associated with increased morbidity in the early years of life due to the development of chronic symptoms<br>Be aware of immunoprophylaxis against Respiratory Syncitial Virus<br>Be able to:<br>Appropriately admit a child with bronchiolitis to the hospital<br>Initiate the appropriate supportive management of a child with bronchiolitis |
| Aspiration syndromes ( See also ***Upper Airway: Foreign Body***) | |
| History | Know the long-term complications of foreign body aspiration<br>Know that there is often no history of foreign body aspiration<br>Know the pulmonary complications of gastroesophageal reflux<br>Know that recurrent aspiration can recur with swallowing disorders independent of gastroesophageal reflux<br>Understand that hydrocarbon pneumonitis may cause acute and chronic lung disease<br>Know that aspiration can occur despite the presence of a tracheostomy<br>Be able to elicit a history suggestive of aspiration |
| Physical | Understand that foreign body aspiration may present with a variety of physical signs |
| Diagnosis | Be able to:<br>Evaluate for suspected aspiration<br>Recognize on x-ray the possible radiographic manifestations of foreign body aspiration |
| Management | Be able to:<br>Plan the management of a patient with aspiration of a foreign body<br>Plan the management of hydrocarbon pneumonitis |
| Bronchiectasis | |
| History | Know the conditions which may predispose to the development of bronchiectasis (eg, infection: measles, |

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| | pertussis, TB; cystic fibrosis, foreign body, gastro-esephageal reflux, immunodeficiency, primary ciliary dyskinesia)<br>Be able to elicit symptoms suggestive of bronchiectasis (eg, chronic cough, purulent sputum, recurrent chest infections) |
| Physical | Be able to detect the physical findings associated with bronchiectasis |
| Diagnosis | Be able to:<br>Formulate the differential diagnosis of bronchiectasis<br>Utilize investigations to elicit the underlying cause (eg, sweat test, pH studies, immune function, ciliary function tests)<br>Use appropriate radiological imaging studies of the chest to arrive at the diagnosis of bronchiectasis in a child |
| Management | Be able to:<br>Treat acute exacerbations of infections guided by microbiological analysis<br>Work collaboratively with physical therapists to provide physiotherapy<br>Refer to specialists as necessary |

| Pneumonia (see also ***Critical Care in Children: Pneumonia, bronchiolitis***; ***Critical Care in Neonates: Congenital Pneumonia***; for specific organism see ***Infectious Diseases***) | |
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| History | Know the definitions of community-acquired, nosocomial, pneumonia and slowly resolving pneumonia<br>Know the etiologies (bacterial/viral/ fungal/mycobacterial/parasitic ) of pneumonia in children of different ages and in those that are immunosuppressed<br>Know the major acute and chronic complications of pneumonia, (eg, empyema, sepsis, pneumothorax, bronchopleural fistula, and pneumatoceles)<br>Know which organisms are likely to cause the pleural and parenchymal complications<br>Know which congenital lesions of the lung may mimic pneumonia<br>Understand the significance of pneumonia in a child with neuromuscular disease<br>Understand the importance of immunization status of a child with pneumonia |

## *Respiratory*

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| | Understand the contribution of pneumonia to global under-5 mortality and the patterns of infection in developed and developing countries<br>Understand the factors responsible for the changing incidence in pneumonia in different countries<br>Understand the significance of symptoms such as tachypnea and chest pain<br>Be able to:<br>Elicit symptoms that are suggestive of the development of pneumonia<br>Identify factors that may predispose to the development and transmission of pneumonia<br>Understand the pathogenesis of pneumonia including the role of normal protective mechanisms |
| Physical | Know the differences in clinical presentation of different types of pneumonia and in children of different ages<br>Be able to detect the range of findings that may be found in pneumonia (eg, dullness on percussion, abnormal tactile or vocal fremitus, reduced breath sounds, crackles, bronchial breathing, and a friction rub) |
| Diagnosis | Know the Integrated Management of Children Illness (IMCI) guidance on the differential diagnosis of cough and difficulty in breathing in children and the classification of pneumonia<br>Understand the diagnostic value and limitations of laboratory and radiological investigations<br>Know the indications for the use of sonography, CT scan, bronchoscopy, pleural tap, and open lung biopsy<br>Be able to:<br>Interpret the significance of tachypnea, chest in-drawing, and cyanosis in a child with respiratory distress<br>Interpret physical signs to identify the site of consolidation and clinical complications such as empyema or pleural effusion or pneumothorax<br>Interpret appropriate laboratory investigations<br>Identify the usual radiological features of bacterial and viral pneumonia and the distinguishing radiological features of staphylococcus, pneumococcus, tuberculosis, mycoplasma, and chlamydia pneumonia<br>Refer for invasive studies (eg, bronchoscopy) when indicated in the evaluation of pneumonia<br>Arrive at the differential diagnosis of recurrent pneumonia<br>Perform a diagnostic pleural tap if indicated |
| Management | Be aware of local, national, and international guidelines on the management of pneumonia |

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| | Know the factors which determine the selection of appropriate antibiotics and duration of treatment for a child with pneumonia<br>Understand the role of empiric therapy<br>Understand the expected clinical course of a child who is treated appropriately and the factors that should be considered in a child with slowly resolving pneumonia<br>Understand the factors involved in global programs for the prevention and/or control of pneumonia<br>Be able to:<br>Identify when a child requires hospitalization<br>Interpret and act upon oximeter monitoring<br>Apply the IMCI guidance on the management of pneumonia including appropriate antimicrobial therapy, oxygen, and supportive care appropriate to the severity of pneumonia<br>Take into consideration any underlying conditions such as immunosuppression or neuromuscular disease<br>Work collaboratively with other health professionals including nurses, physiotherapists and community health workers<br>Manage complications such as pleural effusions and empyema, referring to other specialists as appropriate<br>Explain clinical course and prognosis to the child and care givers, including when the child can be safely discharged<br>Discuss with families and other health care workers the role of immunization and antimicrobial prophylaxis in preventing pneumonia, including the relative effectiveness of these measures |
| Lung abscess | |
| History | Know the pattern of illness in children who develop lung abscess following uncomplicated pneumonia<br>Understand the epidemiology and organisms associated with development of lung abscess |
| Physical | Recognize that the physical exam in patients with lung abscess is most often non-specific and consistent with that of simple pneumonia |
| Diagnosis | Be able to use chest radiography and CT to identify lung abscess |
| Management | Understand that, depending on etiology, surgical intervention is often not necessary<br>Be able to: |

## *Respiratory*

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| | Appropriately plan and manage the medical therapy for lung abscess<br>Refer to specialists appropriately |
| Pulmonary eosinophilia | |
| History | Know the potential causes of pulmonary eosinophilia (eg, Infection: Ascaris Toxocara, Strongyloides infections Drugs: aspirin, penicillins, sulphonamides)<br>Know symptoms include cough, wheezing, shortness of breath, hemoptysis, weight loss) |
| Physical | Know that physical examination findings are not specific |
| Diagnosis | Know the differential diagnosis of pulmonary eosinophilia<br>Be able to utilize blood and radiological investigations to help make diagnosis |
| Management | Plan management based on likely etiology |

| **Asthma**<br>By the end of training, the resident should: | |
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| History | Know that asthmatic patients may have bronchial hyper-responsiveness to exercise, viral URI, allergen exposure, weather changes, smoke pollutants and other irritants, aspirin, and beta adrenergic blocking drugs<br>Know that children with early-onset asthma (< 3 years of age) who have a parental history of asthma, a confirmed diagnosis of atopic dermatitis, or sensitization to aeroallergens are least likely to outgrow asthma<br>Understand the pathophysiology of asthma and its treatment<br>Know about the patterns of asthma and contributing factors<br>Be able to:<br>Identify the presence of atopic dermatitis (eczema) as an indicator of potentially more severe and persistent asthma<br>Elicit a history of non-specific symptoms that may be indicative of asthma such as nighttime cough<br>Identify the symptoms associated with exercise induced asthma |
| Physical | Be able to:<br>Assess the severity of an asthma attack |

## *Respiratory*

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| | Identify the development of atelectasis during an acute asthma exacerbation<br>Identify the signs of poorly controlled asthma<br>Identify other signs of atopy<br>Identify the presence of wheezing on lung examination<br>Assess reversibility |
| Diagnosis | Know the indications for chest radiography in an acute wheezing episode<br>Be able to:<br>Classify asthma based on frequency and severity of symptoms<br>Interpret pulmonary function tests in a patient with asthma<br>Identify the characteristics of exercise-induced asthma (eg, coughing and wheezing 5 to 6 minutes after exercise with gradual improvement after 20 to 30 minutes of rest) |
| Management | Know that exercised-induced asthma may be a sign of poorly controlled asthma<br>Know that corticosteroids in an acute exacerbation of asthma can increase adrenergic response, improve FEV1, and improve oxygenation<br>Understand the risks and benefits of inhaled corticosteroids<br>Know the kinetics of short- and long-acting inhaled beta-adrenergic agonists<br>Know that excessive daily use of beta adrenergic agonists has been associated with increased mortality and with diminished symptom control in asthma<br>Know that corticosteroids interfere with the late-phase but not the immediate response to allergen exposure<br>Know that long-term treatment with inhaled corticosteroids decreases bronchial inflammation and bronchial hyperresponsiveness<br>Know the role of leukotriene antagonists in the management of asthma<br>Know the importance of self-assessment in a patient with asthma<br>Know the importance of patient education in asthma management<br>Know about the complications of long-term use of medications for asthma |

## *Respiratory*

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| | Be able to:<br>Develop a discharge plan for a hospitalized asthmatic child that includes assessment of potential asthma triggers in the home, school, and neighborhood<br>Plan the most appropriate treatment for a patient with an acute exacerbation of asthma<br>Recognize the clinical manifestations of toxicity to adrenergic agonists (eg, muscular tremor, tachycardia, hypokalemia)<br>Recognize the characteristics of a child at increased risk of ICU hospitalization because of asthma (eg, one or more life-threatening episodes, severe asthma requiring chronic steroids, poor control of daily symptoms, abnormal FEV1, poor adherence, depression/stress)<br>Plan appropriate outpatient treatment of mild, moderate, or severe persistent asthma to include daily anti-inflammatory drugs<br>Institute appropriate emergency treatment<br>Recognize when help of other colleagues is needed<br>Lead treatment of severe asthma and review ongoing treatment<br>Institute age-appropriate individualized management plan for asthma<br>Teach children how to use a peak flow meter, journal, and to assess inhaler technique<br>Modify an asthma management plan appropriately<br>Ensure the child has access to emergency treatment at school and other settings<br>Identify impending respiratory failure during an acute asthma exacerbation |

| **Cystic fibrosis**<br>By the end of training, the residents should: | |
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| History | Understand the pathogenesis, genetics and natural history of cystic fibrosis<br>Know the common microbial pathogens involved in the pulmonary complications of cystic fibrosis<br>Understand the inheritance issues related to cystic fibrosis<br>Know the association of rectal prolapse and cystic fibrosis |

## *Respiratory*

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| | Know that hemoptysis and pneumothorax can be potentially life-threatening complications of cystic fibrosis<br>Know that children with cystic fibrosis may present with failure to thrive and/or recurrent respiratory infections.<br>Be able to:<br>Identify respiratory symptoms suggestive of cystic fibrosis<br>Identify the non-pulmonary manifestations of cystic fibrosis in the neonatal period (eg, meconium ileus, meconium peritonitis, and prolonged jaundice)<br>Identify gastrointestinal symptoms suggestive of cystic fibrosis (eg, steatorrhea, failure to thrive, intestinal obstruction)<br>Identify the common extrapulmonary complications of cystic fibrosis (eg, liver disease, diabetes, salt depletion, low bone mineral density) |
| Physical | Be able to:<br>Identify clubbing and any chest signs<br>Assess nutritional status<br>Identify signs of complications (eg, edema secondary to hypoproteinemia, hepatomegaly) |
| Diagnosis | Be aware of the uses and shortcomings of various testing modalities for cystic fibrosis, including antenatal and neonatal screening<br>Be able to:<br>Plan the appropriate diagnostic evaluation of a child suspected of having cystic fibrosis<br>Recognize and diagnose exocrine pancreatic insufficiency in infants<br>Utilize investigations to diagnose complications of cystic fibrosis |
| Management | Know the indications for aggressive management with antimicrobial therapy for cystic fibrosis<br>Understand the need for supplemental calories, pancreatic enzymes, and fat-soluble vitamins in patients with cystic fibrosis<br>Understand the management of pulmonary disease (eg, inhaled antibiotics, DNase) in patients with cystic fibrosis<br>Be able to:<br>Manage a child with cystic fibrosis in partnership with a specialist |

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| | Work with a multi-disciplinary team, particularly physiotherapy and dieticians<br>Recognize the importance of planning for survival into adulthood for patients with cystic fibrosis<br>Plan appropriate management of a patient with extra-pulmonary complications of cystic fibrosis |

| **Primary ciliary dyskinesia (dysmotile cilia syndrome)**<br>By the end of training, the resident should: | |
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| History | Know that otitis media, recurrent sinusitis, dextrocardia, and/or bronchiectasis may be due to primary ciliary dyskinesia |
| Physical | Be able to diagnose situs inversus on physical exam |
| Diagnosis | Be able to plan the appropriate diagnostic evaluation of a patient suspected of having primary ciliary dyskinesia, including exclusion of other diagnosis |
| Management | Consult appropriately with specialists in the ongoing management of patients with primary ciliary dyskinesia |

| **Extrapulmonary**<br>By the end of training, the resident should: | |
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| Pleural fluid/empyma | |
| History | Understand the etiologies of pleural fluid accumulations (eg, transudate, exudates, empyema, chylothorax) |
| Physical | Be able to detect the physical findings associated with accumulation of pleural fluid |
| Diagnosis | Be able to diagnose the presence of pleural fluid with an imaging study of the chest |
| Management | Be able to manage accumulation of chest fluid according to the cause and in association with specialist as necessary |
| Pneumothorax, pneumomediastinum | |
| History | Know that spontaneous pneumothoraces occur and may recur in young asthenic boys<br>Know the natural history of spontaneous pneumothorax<br>Know that asthma may be associated with pneumothorax and/or pneumomediastinum<br>Know that pneumothorax may be a complication of resuscitation and mechanical ventilation |

## *Respiratory*

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| Physical | Be able to:<br>Identify the signs and symptoms of pneumothorax<br>Identify tension pneumothorax<br>Identify subcutaneous emphysema |
| Diagnosis | Be able to:<br>Formulate a differential diagnosis<br>Identify pneumothorax and/or pneumomediastinum on chest radiograph |
| Management | Understand that pneumomediastinum usually requires no intervention<br>Be able to plan and initiate the appropriate therapy for a child with pneumothorax |
| Thoracic deformities (see also ***Musculoskeletal Disorders: Kyphosis*** and ***Scoliosis***) | |
| History | Know the association between scoliosis and restrictive pulmonary disease<br>Know that severe progressive neuromuscular disease of any etiology can produce serious restrictive pulmonary disease<br>Know that pectus excavatum is not usually associated with pulmonary disease or exercise limitation |
| Physical | Be able to identify thoracic deformities |
| Diagnosis | Know that pulmonary function has to be evaluated in patients with rigid kyphosis |
| Management | Be able to refer to specialist as appropriate |
| Mediastinal masses including lymph nodes | |
| History | Know the symptoms associated with a mediastinal mass |
| Physical | Be able to identify jugular venous distention, persistent/irreversible wheezing, hoarseness, and arrhythmia as signs of mediastinal mass and compression |
| Diagnosis | Be able to:<br>Utilize chest radiography and computerized tomography to assist in the diagnosis of a mediastinal mass |
| Management | Understand the risks of sedation in a patient with a mediastinal mass<br>Be able to refer to appropriate specialist |

## *Respiratory*

| **Pulmonary hypertension and cor pulmonale**<br>By the end of training, the resident should: | |
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| History | Know that oxygenation may decrease during abnormal sleep, which may cause pulmonary hypertension or exacerbate existing cor pulmonale<br>Know that pulmonary hypertension is potentially reversible<br>Know the situations in which pulmonary hypertension and cor pulmonale may occur |
| Physical | Know that there are no specific physical findings associated with pulmonary hypertension until it becomes very severe |
| Diagnosis | Understand the echocardiographic findings that are associated with pulmonary hypertension |
| Management | Know that certain medications may be useful in the management of pulmonary hypertension |

| **Respiratory sleep disorders** (see also ***Rehabilitation: Sleep related disorders***)<br>By the end of training, the resident should: | |
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| History | Know the respiratory and non-respiratory conditions that may cause sleep disorders<br>Know that children with severe obstructive apnea due to upper airway obstruction are at significant risk for respiratory distress postoperatively (eg, due to postoperative airway swelling, postoperative obstructive pulmonary edema)<br>Know common causes of somnolence in adolescents<br>Know that narcolepsy can be present in adolescents<br>Know that prescribed and over-the-counter medications may affect sleep<br>Be able to take an accurate history to elicit symptoms suggestive of disordered sleep (eg, snoring, apnea, cor pulmonale, growth failure, daytime somnulence) |
| Physical | Be able to identify physical signs suggestive of chronic hypoxemia |
| Diagnosis | Understand the role of sleep physiology studies (eg, polysomnography, pneumotachograph, respiratory inductance plethysmography,) together with pulse oximetry and blood gas analysis in making a diagnosis of a sleep disorder |

## *Respiratory*

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| | Be able to formulate the differential diagnosis of obstructive sleep apnea in children |
| Management | Know the indications for surgery in adenoid/tonsillar hypertrophy causing obstructive sleep apnea<br>Know which respiratory conditions may be managed by home ventilation support (eg, obstructive airways disease, parenchymal lung diseases; cystic fibrosis and bronchopulmonary dysplasia and disorders control of ventilation)<br>Know the advantages and disadvantages of home mechanical ventilation<br>Understand the ethical issues surrounding long-term ventilation support<br>Be able to:<br>Consult with physiotherapists to provide chest physiotherapy to prevent complications of chronic lung disease and ventilation difficulties<br>Refer to specialists for the provision of home ventilation if this is available in your locality |

| **Sudden infant death syndrome/ acute life threatening events**<br>By the end of training, the resident should: | |
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| History | Know the risk factors for sudden infant death syndrome (unexpected infant deaths)<br>Be able to collect, with sensitivity, as much information as possible about factors that may have contributed to an infant's unexpected death. |
| Physical | Be able to recognize a child with an apparent life-threatening event (ALTE) |
| Diagnosis | Be able to:<br>Exclude identifiable causes of apparent life-threatening events (ALTE) in infancy(eg, infection, metabolic abnormality, gastroesophageal reflux, aspiration, cardiac dysrhythmia, seizures, non-accidental trauma, apnea of infancy)<br>Recognize the limitations of cardiorespiratory ("apnea") monitors in following infants with apparent life-threatening events (ALTE) |
| Management | Be able to:<br>Provide initial resuscitation as appropriate in a child with and an apparent life-threatening event (ALTE)<br>Counsel families who have had a child who has had an acute life threatening event or and unexplained |

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| | death about avoidance of risk factors<br><br>Work collaboratively with other professionals in investigating and supporting families of a child who has had an acute life threatening event or unexplained death |

May 16, 2014 – Pneumonia updated

## *Rheumatology*

| **General**<br>By the end of training, the resident should: | |
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| History | Understand the pathophysiology of common disorders of the musculoskeletal system<br>Be able to:<br>Perform a relevant focused history to guide physical examination and formulation of differential diagnoses<br>Elicit a history of disease associations of rheumatologic conditions (eg, eye disease)<br>Recognize the association of musculoskeletal presentations and common chronic diseases (eg, psoriasis, inflammatory bowel disease) |
| Physical | Be able to:<br>Perform a musculoskeletal assessment including a screening examination<br>Undertake a focused clinical examination and interpret the signs |
| Diagnosis | Be able to:<br>Consider a rheumatologic disorder when the history and examination are suggestive<br>Select and interpret the appropriate investigations that are helpful in establishing a differential diagnosis<br>Recognize features in the clinical presentation or investigation findings which suggest serious pathology (eg, inflammation, malignancy, infection, and vasculitis)<br>Recognize features in the clinical presentation or investigation findings which suggest physical abuse, emotional abuse, and/or neglect<br>Distinguish between inflammatory and non-inflammatory conditions and idiopathic causes |
| Management | Know the broad range of treatments used in rheumatologic disorders<br>Understand the indication for and complications of immunosuppressive treatment<br>Be able to:<br>Counsel families appropriately regarding treatment |

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| | Involve multi-disciplinary team and other professionals involved in the care of children with musculoskeletal conditions<br>Recognize when to request the opinion of pediatric rheumatologists or orthopedic surgeons<br>Consult effectively with specialists about management |

| **Specific disorders/diseases**<br>By the end of training, the resident should: | |
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| Joint swelling | |
| History | Know the causes of joint swelling at single and multiple sites |
| Physical | Be able to:<br>Identify joint swelling and abnormal range of joint movement on examination |
| Diagnosis | Be able to:<br>Select the appropriate tests to distinguish between traumatic, infectious, inflammatory causes, malignant, neurologic, or other causes |
| Management | Be able to:<br>Request the opinion of pediatric rheumatologist or orthopedic surgeon as appropriate<br>Contact the appropriate specialist for diagnostic and management advice |
| Musculoskeletal pain (limb, back, neck) | |
| History | Understand the importance of referred pain<br>Be able to:<br>Perform a focused history to elicit possible causes of pain<br>Recognize benign causes of musculoskeletal pain ( eg, growing pains)<br>Recognize features in the history that may suggest functional pain (eg, regional pain syndrome and diffuse chronic pain syndromes) |

## *Rheumatology*

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| Physical | Be able to:<br>Recognize musculoskeletal deformities associated with pain (eg, scoliosis, Klippel Feil, torticollis)<br>Examine a painful joint in a sensitive manner |
| Diagnosis | Be able to:<br>Distinguish between inflammatory and mechanical conditions<br>Recognize features that suggest serious pathology<br>Establish a differential diagnosis to guide investigation and management<br>Select investigations that differentiate between functional and pathological causes of pain |
| Management | Be able to:<br>Prescribe appropriate analgesia<br>Manage growing pains<br>Recognize when to request the opinion of pediatric rheumatologists or orthopedic surgeons<br>Take a multidisciplinary approach to children with complex chronic pain syndromes |
| Limp | |
| History | Be able to:<br>Perform a focused history, taking into consideration the common clinical presentations of a limp at different ages |
| Physical | Be able to:<br>Perform a thorough musculoskeletal and neurologic assessment |
| Diagnosis | Be able to:<br>Select the appropriate tests to distinguish between traumatic, infectious, inflammatory, malignant, neurologic, or other causes<br>Recognize when a limp may be functional |

## *Rheumatology*

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| Management | Be able to:<br>Contact appropriate specialists for assistance |
| Leg alignment (normal variants) | |
| History | Know the predisposing factors and presentation of rickets<br>Be able to:<br>Recognize normal patterns of leg alignment and foot posture at different ages (eg, bow legs, knock knees, in-toeing, and flat feet) |
| Physical | Be able to:<br>Elicit limb length discrepancy<br>Detect hip dislocation<br>Recognize the clinical features of rickets<br>Detect and describe abnormalities of leg alignment and posture |
| Diagnosis | Be able to:<br>Select and interpret appropriate investigations of differing patterns of leg alignment |
| Management | Be able to:<br>Refer to a specialist when required |
| Multi-system disease | |
| History | Be able to:<br>Perform a focused history recognizing that rash, fever, and lymphadenopathy may be features of systemic rheumatologic disorders |
| Physical | Be able to:<br>Recognize clinical signs suggestive of systemic rheumatologic disorders<br>Undertake a focused examination to elicit suggestive features (eg, erythematous rash suggestive of JIA then |

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| | detect lymphadenopathy and hepatospenomegaly) |
| Diagnosis | Be able to:<br>Select and interpret a range of investigations to differentiate between rheumatological causes and other systemic illness (eg, infection or malignancy) |
| Management | Be able to:<br>Refer to a specialist when required |

| **Systemic lupus erythematosus (SLE)**<br>By the end of training, the resident should: | |
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| History | Know the current classification of SLE and limitations of its use<br>Understand the spectrum of clinical presentations and how they vary among ethnic groups<br>Know the implications of infection and its relationship to mortality in SLE<br>Know that renal disease is a common complication of SLE<br>Understand the significance of multi-organ involvement in SLE<br>Know the medications that are known to cause a lupus-like syndrome |
| Physical | Be able to:<br>Identify clinical signs associated with SLE including CNS and neonatal disease |
| Diagnosis | Understand the implications of the presence of anticardiolipin antibodies<br>Understand the implications and limitations of a positive anti-nuclear test<br>Understand the value of anti-double-stranded DNA in establishing a diagnosis of SLE<br>Be able to:<br>Select and interpret investigations important in the diagnosis of SLE<br>Identify the hematologic manifestations of SLE |

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| | Select tests that are useful in evaluating neonatal lupus |
| Management | Understand useful drugs for the treatment of SLE<br>Be able to:<br>Recognize and manage the major complications of corticosteroid therapy in systemic lupus erythematosus<br>Use investigations that are useful in monitoring the disease<br>Consult effectively with specialists about management |

| **Vasculitis**<br>By the end of training, the resident should: | |
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| Henoch-Schonlein purpura (HSP; see also ***Nephrology***) | |
| History | Be able to:<br>Perform a focused history recognizing features suggestive of HSP |
| Physical | Be able to:<br>Recognize the typical and atypical presentations of HSP |
| Diagnosis | Be able to:<br>Select and interpret investigations that are relevant to exclude other diagnoses and to monitor the disease |
| Management | Be able to:<br>Establish a short and long term management plan for a child with HSP<br>Recognize features in the clinical course of HSP that suggest a worse prognosis<br>Treat symptoms of joint and abdominal pain appropriately<br>Recognize complications of gastrointestinal involvement such as bleeding or intussusception<br>Recognize and understand the implications of renal involvement (eg, how to monitor and prognosis)<br>Involve specialists in the care of the patients when appropriate |

## *Rheumatology*

| Kawasaki disease | |
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| History | Be able to:<br>Perform a focused history recognizing the features of Kawasaki disease |
| Physical | Be able to:<br>Recognize the dermatologic manifestations of Kawasaki disease |
| Diagnosis | Know the criteria for making a diagnosis of Kawasaki disease<br>Understand the importance of cardiologic investigation<br>Be able to:<br>Formulate the differential diagnosis of Kawasaki disease<br>Select and interpret investigations that may be helpful in the differential diagnosis |
| Management | Be able to:<br>Recognize the value of high-dose intravenous immune globulin and aspirin therapy in the treatment of Kawasaki disease<br>Involve specialists in the care of the patients when appropriate |

| **Other vasculitides (polyarteritis nodosa, microscopic polyangiitis, Wegener's granulomatosis, Churg Strauss, Takayasu arteritis, Bechet syndrome)**<br>By the end of training, the resident should: | |
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| History | Be able to:<br>Recognize features in the history which suggest an underlying vasculitis |
| Physical | Be able to:<br>Identify rashes that suggest an underlying vasculitis<br>Identify ulcerative features seen in Bechet syndrome |
| Diagnosis | Understand the significance and limitations of the presence of anti-neutrophils antibodies |

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| | Be able to:<br>Consider a diagnosis of vasculitis when the symptoms and signs are suggestive<br>Select investigations helpful in establishing a diagnosis<br>Consult other specialists where indicated |
| Management | Understand the range of treatments used including steroids, other immunosuppressive agents, cytotoxic drugs, and biological therapies<br>Be able to:<br>Recognize when and which specialists to contact for advice |

| **Juvenile rheumatoid (idiopathic) arthritis**<br>By the end of training, the resident should: | |
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| History | Know the ocular complications of juvenile rheumatoid (idiopathic) arthritis<br>Be able to:<br>Recognize those features in the history which suggests JIA |
| Physical | Know that rheumatoid factor is usually negative in juvenile rheumatoid (idiopathic) arthritis<br>Be able to:<br>Recognize major presentations of JIA (ie, systemic, oligoarthritis, polyarthritis, psoriatic arthritis, enthesitis arthritis)<br>Distinguish between inflammatory arthritis and arthralgia |
| Diagnosis | Understand the limitations the IgM rheumatoid factor in diagnosis<br>Know the implications of a positive ANA investigation as a marker for eye disease in a patient with cardiac complications of systemic juvenile rheumatoid (idiopathic) arthritis<br>Understand the value of joint aspirate to distinguish between juvenile rheumatoid (idiopathic) arthritis and septic arthritis |

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| | Be able to:<br>Use the International League of Associations for Rheumatology (ILAR) classification of JIA in establishing a diagnosis<br>Recognize that juvenile rheumatoid (idiopathic) arthritis is often a disease of exclusion<br>Formulate the differential diagnosis of JIA<br>Select and interpret investigations useful in making a differential diagnosis |
| Management | Understand the pharmacologic treatment of JIA including non-steroidal anti-inflammatory agents, steroids, methotrexate, and biological agents<br>Be able to:<br>Recognize the need for a comprehensive program for the management of JIA (eg, physical therapy)<br>Recognize complications of therapy and counsel families appropriately<br>Recognize when and which specialists to contact for advice<br>Manage a child with JIA jointly with a specialist |

| **Other rheumatologic disorders (juvenile dermatomysitis (JDM), polymyositis, sclerderma, sarcoid, mixed connective tissue disease)**<br>By the end of training, the resident should: | |
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| History | Be able to:<br>Recognize features in the history that may suggest rheumatologic disorders |
| Physical | Be able to:<br>Recognize the rash characteristic of JDM<br>Demonstrate the proximal myopathy seen in JDM<br>Recognize calcinosis, a complication sometimes seen in JDM<br>Recognize the varying dermatological manifestations of scleroderma including morphea linear scleroderma |

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| | and Raynaud's phenomenon |
| Diagnosis | Know the criteria for establishing a diagnosis of JDM, polymyositis, sclerderma, sarcoid, and mixed connective tissue diseases<br>Understand the investigations that may be helpful in identifying the complications of scleroderma<br>Understand the relevance and limitations of serum levels of angiotensin converting enzyme in a suspected diagnosis of sarcoidosis<br>Be able to:<br>Select and interpret investigations useful in establishing a diagnosis of JDM, polymyositis, sclerderma, sarcoid, and mixed connective tissue diseases |
| Management | Understand the differing prognoses of localized scleroderma and systemic sclerosis<br>Be able to:<br>Prescribe the range of treatments used for JDM, including steroids and cytotoxic agents<br>Counsel families appropriately<br>Recognize when and which specialists to contact for advice |

| **Ankylosing spondylitis**<br>By the end of training, the resident should: | |
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| History | Be able to:<br>Recognize features in the history suggestive of ankylosing spondylitis (eg, pattern of pain and stiffness) |
| Physical | Be able to:<br>Perform a full musculoskeletal assessment to demonstrate joints involved<br>Demonstrate loss of lumbosacral mobility if present<br>Identify signs of iridocyclitis |
| Diagnosis | Know the association with HLA B27 |

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| | Be able to:<br>Select and interpret investigations helpful in making the differential diagnosis<br>Identify the changes seen on X-ray that may be present in ankylosing spondylitis |
| Management | Be able to:<br>Appropriately prescribe analgesia<br>Involve other members of the multidisciplinary team in overall management plan (eg, physiotherapy)<br>Counsel families about the inheritance and natural history of the condition |

| **Other arthritis and arthralgia syndromes (post-infectious, reactive arthritis ,arthritis of inflammatory bowel syndrome)**<br>By the end of training, the resident should: | |
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| History | Know the common viral and bacterial infections that are associated with a reactive arthritis and post-infectious arthritis<br>Understand that arthritis may occur in patients with inflammatory bowel disease<br>Be able to:<br>Take a focused history and elicit those features that are suggestive of arthritic or arthralgia syndromes (eg, reactive or post-infectious arthritis) |
| Physical | Be able to:<br>Undertake a complete joint examination eliciting features of arthritis or arthralgia<br>Recognize the clinical manifestations of arthritis and arthralgia syndromes |
| Diagnosis | Be able to:<br>Select and interpret investigations useful in diagnosing a reactive or post-infectious arthritis<br>Identify common illnesses associated with arthritis and/or arthralgia syndromes<br>Select investigations in a child presenting with an irritable hip to differentiate between a transient synovitis and more serious underlying causes |

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| Management | Be able to:<br>Plan the management for a child with an arthritis or arthrlagia syndromes<br>Recognize that the management of inflammatory bowel disease related arthritis is primarily dependent on appropriate management of the underlying bowel disease |

| **Hypermobility syndromes (including Ehlers Danlos and Marfans)**<br>By the end of training, the resident should: | |
|---|---|
| History | Recognize the importance of taking a detailed family history<br>Understand the relationship between hypermobility and joint complaints<br>Be able to:<br>Take a focused history recognizing features that are suggestive of abnormal joint mobility |
| Physical | Be able to:<br>Demonstrate features of joint hypermobility using Beighton's criteria |
| Diagnosis | Understand the value and limitations of genetic testing in hypermobility syndromes<br>Be able to:<br>Identify clinical features that differentiate benign hypermobility syndrome, Marfan's, and Ehlers Danlos syndrome<br>Identify clinical features that may differentiate the subtypes of Ehlers Danlos |
| Management | Know that the treatment of hypermobility syndrome is by explanation (ie, counsel the patient regarding avoidance of excessive movement)<br>Be able to:<br>Manage the symptoms of hypermobility involving members of the multidisciplinary team appropriately<br>Implement cardiac and ophthalmological screening for patients with Marfan's |

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| | Refer to the appropriate specialists for advice |

## *Urology*

| **General**<br>By the end of training, the resident should: | |
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| History | Understand normal structure, function, physiology, and development of the urogenital system<br>Understand the maturation of genital organs<br>Understand the basics of voiding patterns and anomalies |
| Physical | Be able to:<br>Identify major genital and urinary tract malformation<br>Identify the physical findings seen with acute urological diseases<br>Identify normal and abnormal physical findings of the urogenital system |
| Diagnosis | Know when to perform cystoscopy<br>Be able to:<br>Utilize ultrasonography and radiology imaging and understand their limitations<br>Utilize appropriate tests to assess bladder function |
| Management | Be able to:<br>Plan and initiate antibiotic therapy when indicated<br>Implement proper principles of pharmacotherapy for bladder dysfunction (eg, anticholinergic, alpha blocking agents)<br>Consult urologist when appropriate |

| **Disorders of the bladder**<br>By the end of training, the resident should: |
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| Injury from drugs and how to prevent bladder toxicity | |
| History | Know the common causes of drug induced bladder injury (eg, cyclophosphamide metabolite toxicity)<br>Be able to:<br>Elicit the symptoms of drug induced bladder injury |
| Physical | Be able to:<br>Identify hematuria as a cardinal feature of hemorraghic cystitis |
| Diagnosis | Be able to:<br>Diagnose hemorrhagic cystitis based on history and examination of urine |
| Management | Be able to:<br>Plan appropriate management to avoid bladder toxicity<br>Induce forced diuresis when necessary<br>Consult a urologist as needed |
| Cystitis (see ***Nephrology***) | |
| Self-induced or factitious bladder injury | |
| History | Know the common causes of factitious bladder injury<br>Understand the behaviors which may result in bladder injuries<br>Be able to:<br>Elicit symptoms of bladder injury |
| Physical | Be able to:<br>Elicit signs of bladder injury (eg, suprapubic tenderness) |

## *Urology*

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| Diagnosis | Be able to:<br>Formulate a differential diagnosis of bladder injury |
| Management | Be able to:<br>Consult a urologist when appropriate<br>Counsel patients and/or parents appropriately |
| Neurogenic bladder | |
| History | Know the common causes of congenital and acquired neurogenic bladder (eg, meningomyelocele, posttraumatic, Gillian Barre Syndrome)<br>Be able to<br>Take an accurate voiding history |
| Physical | Be able to:<br>Identify neurological abnormalities which may be associated with neurogenic bladder disorders |
| Diagnosis | Understand the importance of urodynamics<br>Be able to:<br>Select investigations to aid with diagnosis (eg, flow rates and residual urine measurements, urodynamics, radiology) |
| Management | Know the drugs used in controlling bladder function (eg, anticholinergics, alpha blocking drugs)<br>Be able to:<br>Utilize the principles of drug therapy according to urodynamics<br>Recommend intermittent catheterization as appropriate |

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| | Recommend diversion operations when necessary<br>Consult with specialists as appropriate including urologists, nephrologists and continence nurses |

| **Male**<br>By the end of training, the resident should: | |
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| Congenital abnormalities | |
| Hypospadias | |
| History | Understand the various degree of hypospadias<br>Understand that only the more severe types of hypospadias are associated with renal anomalies<br>Be able to:<br>Relate the symptoms to the degree of hypospadias |
| Physical | Be able to:<br>Accurately evaluate the penis and determine the extent/degree of hypospadias |
| Diagnosis | Be able to:<br>Select appropriate investigations |
| Management | Be able to:<br>Advise that circumcision should be delayed in patients with hypospadias<br>Refer to a urologist for management |
| Cryptorchidism (including undescended testes) | |
| History | Understand anomalies of testicular descent (ie, undescended, ectopic, retractile)<br>Understand which conditions are associated with cryptorchidism (eg, 'prune belly' or Eagle Barrett syndrome) |

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| Physical | Be able to:<br>Distinguish between undescended testes and retractile testes |
| Diagnosis | Be able to:<br>Diagnose cryptorchidism |
| Management | Be able to:<br>Counsel parents regarding complications of undescended testes (eg, infertility and increased incidence of testicular tumors)<br>Plan the appropriate and timely management of a patient with undescended testes<br>Evaluate for intersex disorders in hypospadias patients with bilateral cryptorchidism<br>Refer to specialists as appropriate |
| Micropenis | |
| History | Know the significance of hypoglycemia in a patient with micropenis |
| Physical | Be able to:<br>Identify and understand the significance of the suprapubic fat pad in evaluating penile size |
| Diagnosis | Be able to:<br>Diagnose micropenis by measurement in a newborn boy |
| Management | Be able to:<br>Counsel parents appropriately |
| Phimosis and paraphimosis | |
| History | Understand the principles of phimosis |

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| | Know that the accumulation of smegma beneath the infantile prepuce is not pathologic |
| Physical | Be able to:<br>Identify the physical features of phimosis and paraphimosis |
| Diagnosis | Be able to:<br>Diagnose phimosis and paraphimosis based on history and physical examination |
| Management | Be able to:<br>Recommend circumcision when indicated |
| Acquired abnormalities | |
| Testicular torsion | |
| History | Know that testicular torsion most often occurs in the neonatal period or puberty and can be bilateral<br>Be able to:<br>Identify symptoms that are suggestive of testicular torsion (eg, pain, red swollen scrotum) |
| Physical | Be able to:<br>Perform a physical examination of the testicle(s) and identify characteristics of torsion |
| Diagnosis | Be able to:<br>Initiate ultrasonography with Doppler flow in the diagnosis of testicular torsion and understand its limitations in infants |
| Management | Understand the importance of immediate evaluation of individual with signs and symptoms of testicular torsion<br>Be able to:<br>Provide a prompt referral for surgical exploration of testicular torsion |

## *Urology*

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| Infection | |
| Orchitis/Epididymitis | |
| History | Know causes for orchitis /epididymitis in children and adolescents<br>Understand that sexually transmitted disease are a frequent cause of epididymitis |
| Physical | Be able to:<br>Identify physical findings associated with epididymitis/orchitis |
| Diagnosis | Be able to:<br>Diagnose orchitis based on symptoms and physical findings |
| Management | Be able to:<br>Consult and plan management with a urologist |
| Urethritis | |
| History | Know that sexually transmitted diseases (eg, chlamydial) is an important cause of urethritis in adolescents<br>Be able to:<br>Elicit the symptoms of urethritis |
| Physical | Be able to:<br>Recognize the physical findings associated with urethritis |
| Diagnosis | Be able to:<br>Utilize alternative (ie, non-culture) methods for identifying urethritis when appropriate |
| Management | Be able to:<br>Develop a treatment plan for urethritis |

## *Urology*

| Urethral Stricture | |
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| History | Understand that urethral stricture can be a complication of bladder catheterization<br>Know that hematuria can result from bladder catheterization<br>Be able to:<br>Recognize the symptoms associated with urethral stricture |
| Physical | Be able to:<br>Recognize the signs associated with urethral stricture |
| Diagnosis | Be able to:<br>Diagnose urethral stricture based on history and physical findings |
| Management | Be able to:<br>Develop a treatment plan for urethral stricture, which includes prompt referral to specialist |
| Testicular masses | |
| History | Understand that testicular masses may not be reported promptly by patients |
| Physical | Be able to:<br>Perform a complete genital examination for testicular masses |
| Diagnosis | Be able to:<br>Differentiate testicular masses<br>Select appropriate investigations for the investigation of testicular masses |
| Management | Be able to:<br>Provide a timely referral to specialists |

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| | Counsel parents about the risks for testicular cancer |
| Varicocele | |
| History | Understand the importance of pain as a symptom of a varicocele<br>Understand that most varicocele originate in the left hemiscrotum |
| Physical | Be able to:<br>Examine an adolescent for a varicocele<br>Assess testicular size in an adolescent male<br>Identify a varicocele |
| Diagnosis | Be able to:<br>Diagnose a varicocele based on history and examination |
| Management | Understand that therapy is based upon the severity of the varicocele<br>Know that there are three grades of severity<br>Understand that varicoceles found bilaterally or on the right side require further investigation<br>Understand that some varicoceles can have implications on fertility<br>Be able to:<br>Refer to a urologist when necessary |
| Urethral valve (see ***Nephrology***) | |

| **Female**<br>By the end of training, the resident should: |
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| Congenital abnormalities |

## *Urology*

| Imperforate hymen | |
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| History | Understand the signs of an imperforate hymen<br>Understand issues regarding uterus duplex malformation<br>Be able to:<br>Elicit symptoms suggestive of hematocolpos (eg, ammenorhea, abdominal pain) |
| Physical | |
| Diagnosis | Be able to:<br>Recognize the clinical manifestations of hydrometrocolpos<br>Evaluate the external female genital anatomy |
| Management | Be able to:<br>Refer for surgery following diagnosis |
| Labial adhesions | |
| History | Know that labial adhesions are usually asymptomatic but may present with urinary dribbling or urinary tract infections |
| Physical | Be able to:<br>Identify labial adhesions |
| Diagnosis | Be able to:<br>Diagnose labial adhesions based on history and physical examination |
| Management | Know that spontaneous resolution is common<br>Be able to: |

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| | Prescribe estrogen cream if appropriate |
| Acquired abnormalities | |
| Vulvovaginitis | |
| History | Know the common causes of vulvovaginitis (eg, nonspecific vulvovaginitis, herpes simplex infection, trichomoniasis, candidiasis, pinworm infestation, and foreign body)<br>Be able to:<br>Elicit features in the history suggestive of vulvovaginitis<br>Identify potential causes including possible abuse |
| Physical | Be able to:<br>Recognize vulvovaginitis |
| Diagnosis | Be able to:<br>Formulate the differential diagnosis of the cause of vulvovaginitis |
| Management | Be able to:<br>Initiate therapy according to underlying condition |

| **Recognition of impending systemic failure**<br>By the end of training a resident should: | |
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| General (vital signs) | |
| Physical | Understand that a normal blood pressure reading does not preclude shock<br>Understand the importance of prolonged capillary refilling time in a sick patient<br>Know that a sign of impending coma is increasing respirations<br>Know that a temperature greater than 41 C is frequently associated with invasive bacterial infections<br>Know the conditions associated with malignant hyperthermia during general anesthesia<br>Know that environmental temperature influences capillary refilling time |
| Central nervous system | |
| Diagnosis | Understand the role of neurodiagnostic studies in the determination of brain death<br>Be able to:<br>Recognize that a unilateral dilated pupil as a sign of uncal herniation<br>Distinguish between tachypnea that is compensatory versus hyperventilation<br>Elicit the criteria for brain death |
| Respiratory | |
| Diagnosis | Be able to:<br>Recognize the signs and symptoms of impending respiratory failure<br>Recognize the signs associated with severe airway obstruction |
| Cardiac | |
| Diagnosis | Be able to:<br>Recognize cardiogenic shock |
| Renal | |
| Diagnosis | Be able to: |

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| | Recognize a hypertensive emergency<br>Distinguish between pre-renal and renal azotemia by clinical and laboratory evaluation |
| Management | Be able to:<br>Plan the therapy for a hypertensive emergency |
| Hepatic | |
| Physical | Be able to:<br>Identify the signs and symptoms of impending hepatic failure |
| Electrolytes | |
| Diagnosis | Be able to:<br>Recognize adrenal insufficiency by laboratory and clinical evaluation<br>Distinguish between adrenal insufficiency and the syndrome of inappropriate antidiuretic hormone by laboratory and clinical evaluation<br>Recognize water intoxication in an infant |
| Skin | |
| Management | Be able to:<br>Plan initial antibiotic therapy in a child with purpura and possible sepsis |

| **Emergency life support** (see also ***Emergency Medical Care***)<br>By the end of training a resident should: | |
|---|---|
| General | |
| Management | Be able to:<br>Plan the initial evaluation of an accident victim |
| Airway and respiratory | |
| Management | Know the value of Positive End Expiratory Pressure( PEEP) in a patient with pulmonary edema |

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| | Be able to:<br>Choose the correct ventilator tube size for children of various ages |
| Cardiac and circulatory (shock) | |
| Management | Know the correct method for cardiopulmonary resuscitation in children of all ages<br>Know the guidelines for the initial therapy of hypovolemic or septic shock<br>Be able to:<br>Recognize the occasional value of a bone marrow needle to administer fluid intraosseously in a patient in shock<br>Choose the correct drug(s) for the initial management of septic versus cardiogenic shock |

| **Common conditions requiring emergency life support**<br>By the end of training a resident should: | |
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| Airway and chest | |
| Upper airway obstruction (eg, croup, foreign body) (see also ***Otolaryngology*** and ***Respiratory***) | |
| History | Know that croup is usually preceded by URI (eg, fever, characteristic 'barking cough', nasal discharge, hoarseness) before the onset of symptoms of airway obstruction<br>Know that epiglottitis is more rapidly progressive and fulminant than croup and stridor is a late manifestation.<br>Know that choking or coughing episodes accompanied by wheezing are highly suggestive of an airway foreign body however there could be an asymptomatic period after the initial choking episode<br>Know the age group which is prone for foreign body aspiration |
| Physical | Know that hypoxia is seen only when airway obstruction is nearly complete(as the lungs are normal)<br>Understand that wheeze and not stridor will be auscultated if a foreign body has lodged distal to the trachea |
| Diagnosis | Be able to:<br>Distinguish between asthma and foreign body aspiration |

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| | Recognize that sudden onset of respiratory distress without any viral prodrome may most likely be due to foreign body aspiration<br><br>Recognize that radiological findings (ie, steeple sign in croup, thumb sign in epiglottitis, opaque foreign body) may not be present in a typical case |
| Management | Understand that establishing an airway is a priority over making a diagnosis<br><br>Know that treatment of choice for foreign body aspiration is prompt endoscopic removal with rigid instruments<br><br>Know that antibiotics have no role in treatment of croup<br><br>Be able to:<br><br>Establish an airway (eg, nasal/endotracheal intubation)<br><br>Prescribe appropriate doses of nebulised racemic epinephrine and oral dexamethasone for treatment of croup<br><br>Prescribe preferred i.v. antibiotics for treatment of epiglottitis |
| Pneumonia, bronchiolitis *(*see also ***Respiratory****)* | |
| History | Know the predisposing factors and age group for bronchiolitis<br><br>Be able to:<br><br>Rule out other causes of wheezing in an infant<br><br>Take a thorough birth history, social, and family history in a child with recurrent respiratory symptoms |
| Physical | Know that the lack of audible wheezing is not reassuring if the infant shows other signs of respiratory distress<br><br>Realize that degree of tachypnea does not always correlate with degree of hypoxia<br><br>Be able to:<br><br>Grade respiratory distress appropriately |

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| | Recognize hypoxia and hypercapnia as early findings due to impaired gas exchange<br>Look for the complications of pneumonia(eg, effusion, empyema, pneumothorax)<br>Assess the neurological status of the child<br>Assess the response to bronchodilator in a wheezing child to differentiate between asthma and bronchiolitis |
| Diagnosis | Know that the blood pictures of bronchiolitis and pneumonia could be similar, however, leukocytosis is more pronounced in bacterial pneumonia<br>Be able to:<br>Differentiate bronchiolitis from pneumonia<br>Formulate the diagnosis of acute bronchiolitis based on clinical findings and chest X-ray findings (eg, hyperinflated lungs with patchy atelectasis) and that you may not be able to differentiate it from bacterial pneumonia<br>Order a chest x ray in a patient of pneumonia as appropriate<br>Identify radiological findings characteristic of bacterial pneumonia (eg, lobar consolidation, effusion, empyema)<br>Use the proper tests for making definitive diagnosis (eg, PCR, virus isolation, cultures of blood, pleural fluid)<br>Interpret the serological test for atypical pneumonia |
| Management | Be able to:<br>Refer for hospitalization when necessary<br>Provide appropriate supportive therapy (eg, maintain temperature, airway, oxygenation, breathing and circulation)<br>Prescribe the correct doses of inhaled bronchodilators<br>Prescribe oral steroids and inhaled ribavirin when appropriate<br>Utilize nebulized hypertonic saline in bronchiolitis |

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| | Prescribe the appropriate antibiotics and their doses for empirical therapy of community acquired and nosocomial pneumonia<br>Continue antibiotic therapy for the appropriate duration<br>Prescribe Zinc in pneumonia when appropriate |
| Hemothorax, flail chest | |
| History | Be able to:<br>Elicit mode of injury<br>Query sudden onset and progressively increasing respiratory distress |
| Physical | Be able to:<br>Identify severe respiratory distress associated with unilateral or bilateral absence of breath sounds<br>Recognize muffled heart sounds with features of shock<br>Recognize paradoxical movement of chest |
| Diagnosis | Be able to:<br>Identify a flail chest<br>Correctly interpret chest radiograph for flail chest |
| Management | Be able to:<br>Initiate mechanical ventilation and positive end-expiratory pressure when required<br>Initiate intercostal drainage with a large-bore tube<br>Initiate drainage only with concurrent vascular volume replacement |
| Respiratory distress (see also ***Respiratory***) | |
| History | Be aware of the various upper respiratory, lower respiratory, and non-respiratory causes of respiratory distress |
| Physical | Be aware that a respiratory distress may present as cyanosis, nasal flaring, grunting, tachypnea, wheezing, chest wall retractions and stridor |

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| | Be able to:<br>Recognize a child with early acute respiratory distress syndrome after shock |
| Diagnosis | Be able to:<br>Correctly interpret X-ray, ECG, blood counts, and pulmonary function tests in forming a diagnosis |
| Management | Be able to:<br>Maintain Airway Breathing Circulation in emergency management situations<br>Formulate a plan for planning management of respiratory distress according to primary cause |
| Pulmonary edema | |
| History | Be able to:<br>Elicit an appropriate history of various etiologies (eg, heart disease, severe pneumonia, sepsis, toxin inhalation, drowning) |
| Physical | Be able to:<br>Identify tachypnea and increased work of breathing<br>Identify dependent edema and hepatomegaly<br>Identify Hypoxia<br>Interpret auscultatory findings<br>Recognize features of cardiogenic shock |
| Diagnosis | Be able to:<br>Interpret the typical chest x ray findings<br>Differentiate between cardiogenic and non-cardiogenic pulmonary edema |
| Management | Be able to:<br>Provide supportive treatment to ensure adequate ventilation and oxygenation<br>Implement positive end expiratory pressure or CPAP (continuous positive airways pressure) |

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| | Describe the role of vasodilator and inotropes in cardiogenic cases<br>Describe the role of diuretics in your management approach |
| Pleural effusions | |
| History | Know common etiologies (eg, pneumonia, TB, heart disease)<br>Be able to:<br>Illicit characteristics of pleuritic pain |
| Physical | Be able to:<br>Identify typical auscultatory and percussion findings<br>Monitor oxygen saturation of blood |
| Diagnosis | Be able to:<br>Confirm chest x ray finding by ultrasound or CT scan<br>Send pleural fluid obtained by guided tap to laboratory to be cultured in order to rule-out pneumonia |
| Management | Be able to:<br>Insert intercostal tube drainage for management of moderate to severe effusion/empyema<br>Develop a workable treatment plan for underlying disease |
| Burns | |
| History | Know the age and sex groups most vulnerable to have burns<br>Know whether injury is caused by severe burns or asphyxia and smoke inhalation<br>Be able to:<br>Rule out child abuse or neglect<br>Elicit the mode of injury |
| Physical | Be able to: |

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| | Recognize airway injury in a patient with an acute burn<br>Assess the percentage of body surface area involved<br>Assess the circulatory and neurological status of the child<br>Assess associated injuries (fractures)<br>Monitor urine output |
| Diagnosis | Be able to:<br>Recognize whether patient needs respiratory or cardiovascular support<br>Classify burns on the basis of the depth of burns<br>Measure carboxyhemoglobin |
| Management | Understand the principles of acute care (eg, maintain airway, breathing, circulation)<br>Be able to:<br>Give first aid measures (eg, remove dead tissue)<br>Advise parents about management of long term complications, reconstruction, and rehabilitation<br>Manage electrical burns<br>Provide fluid resuscitation<br>Monitor and recommend energy requirements<br>Control pain with appropriate pain management therapies<br>Ensure prevention of infection (eg, early excision and grafting)<br>Ensure prevention of excessive metabolic expenditures<br>Control bacterial wound flora<br>Use biologic and synthetic dressings to close the wound |
| Near-drowning | |
| History | Understand the factors that predict the prognosis in a patient who has had a near-drowning episode |

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| | Know underlying medical conditions associated with drowning (eg, epilepsy, long QT syndrome)<br>Be able to<br>Rule out the possibility of child abuse |
| Physical | Be able to:<br>Identify features of multi-organ dysfunction<br>Recognize cervical spine injury<br>Begin serial monitoring of vital signs (eg, respiratory rate, heart rate, blood pressure, and temperature) and of oxygenation by pulse oximetry, repeated pulmonary examination, and neurologic assessment |
| Diagnosis | Be able to:<br>Identify cerebral edema in an asphyxiated patient |
| Management | Know that abdominal thrusts may increase the risk of regurgitation and aspiration<br>Understand that comatose drowning patients are at risk for intracranial hypertension<br>Be able to:<br>Focus on rapidly restoring oxygenation, ventilation, and adequate circulation<br>Ensure continuous monitoring of the electrocardiogram (ECG) to arrive at appropriate diagnosis and treatment of arrhythmias<br>Treat hypothermia associated with a near drowning |
| Cardiac and circulatory | |
| History | Be able to: |

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| | Inquire about maternal complications during pregnancy giving rise to structural cardiac defects in a newborn<br>Take appropriate perinatal history of cyanosis, respiratory distress, and shock<br>Identify possible feeding difficulty, poor growth, or recurrent chest infections in an infant<br>Identify Exercise intolerance, chest pain, cyanosis during crying |
| Physical | Be able to:<br>Look for presence of cyanosis, abnormalities in growth, chest wall abnormalities, and any evidence of respiratory distress<br>Identify the character of pulse, BP in all four limbs and JVP<br>Examine heart for presence of murmur |
| Diagnosis | Be able to:<br>Recognize cardiac failure<br>Identify complete heart block from the findings on electrocardio-graphy and physical examination<br>Recognize pericardial tamponade<br>Recognize prolonged QT syndrome in a patient with syncope |
| Management | Be able to:<br>Plan the acute treatment of congestive heart failure in a child or adolescent<br>Plan the initial therapy for paroxysmal atrial tachycardia<br>Plan definitive treatment for structural cardiac defect |
| Acute abdomen | |
| History | Know various GI and non-GI causes of acute abdominal pain<br>Be able to:<br>Differentiate between surgical and non-surgical causes |

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| Physical | Be able to:<br>Assess cardiovascular status and need for urgent surgery |
| Diagnosis | Be able to:<br>Recognize an acute "surgical abdomen"<br>Identify the plain x ray features of various acute abdominal conditions<br>Use CT scan in acute abdominal trauma as appropriate |
| Management | Be able to:<br>Provide supportive treatment (ie, Airway Breathing Circulation)<br>Apply GI decompression<br>Develop a definitive treatment plan<br>Plan the initial evaluation of a patient with probable splenic rupture |
| Head injury and Coma (see also ***Emergency Medical Care*** and ***Sports Medicine***) | |
| History | Know mechanisms of head injury<br>Be able to:<br>Elicit the clinical manifestations of raised Intracranial pressure |
| Physical | Know clinical manifestations of post-concussive syndrome<br>Be able to:<br>Utilize the Glasgow coma scale during the physical examination<br>Recognize the new onset of symptoms, vital signs, and cranial nerve palsies indicative of raised intracranial pressure |
| Diagnosis | Be able to:<br>Utilize, per indications, CT imaging for formulating a diagnosis<br>Classify traumatic brain injury according to Glasgow Coma Score |

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| | Identify findings suggestive of SIADH (syndrome of inappropriate anti-diuretic hormone) or cerebral salt wasting<br>Perform full trauma survey to look for poly-trauma |
| Management | Be able to:<br>Recognize the primary importance of maintaining Airway Breathing Circulation<br>Use proper measures to reduce raised intracranial pressure |
| Multiple traumas (see also ***Emergency Medical Care***) | |
| History | Understand the epidemiology of trauma in children<br>Be aware of the criteria of children requiring trauma center care<br>Be able to:<br>Identify life threatening injuries |
| Physical | Be able to:<br>Use methods to identify children requiring trauma center referral<br>Provide a detailed evaluation of all organ systems<br>Undertake a detailed evaluation of head, spine, chest , abdomen and pelvis, and extremities with suitable imaging modalities<br>Calculate the % of body surface area affected by burns<br>Recognize the clinical signs of a patient with hypovolemic shock |
| Diagnosis | Be able to:<br>Formulate the differential diagnosis of tension pneumothorax, massive hemothorax and cardiac tamponade |
| Management | Understand the importance of triage<br>Be aware of blood group compatibility between various groups |

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| | Be able to:<br>Maintain Airway Breathing Circulation<br>Plan the management of hypovolemic shock<br>Stop ongoing blood loss urgently<br>Provide early immobilization of spinal and extremity injuries |

## *Critical Care in Neonates*

| **General**<br>By the end of training, residents should: | |
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| History | Understand the factors that influence the perinatal and neonatal mortality and morbidity rate<br>Understand the principles and importance of nutrition in the neonatal period<br>Be able to:<br>Describe the morbidities and sequelae of perinatal and neonatal illness<br>Explain the biochemical and physiologic changes of infant's transition from intrauterine to extrauterine life<br>Demonstrate to families an understanding of the implications of having a baby with neonatal problems<br>Undertake a structured perinatal history including: demographic and social data; past illnesses in the mother and family; previous maternal reproductive illness; events occurring in present pregnancy; description of labor and delivery |
| Physical | Be able to:<br>Perform initial examination of the newborn including neurologic examination<br>Perform discharge examination of newborn<br>Differentiate between normal, variation of normal, and abnormal clinical manifestation (eg, Mongolian spot, normal heart rate range)<br>Evaluate neonate presenting with problems<br>Conduct an assessment of nutritional status |
| Diagnosis | Be able to:<br>Apply clinical reasoning when selecting tests, and interpret the results sufficiently well to be able to explain them to parents and members of the multi-disciplinary team<br>Interpret radiological investigations including the basic features of cranial ultrasound and discuss basic findings with parents |

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| Management | Be able to:<br>Advise on, and help with establishment of, breast feeding<br>Recommend appropriate infant nutritional supplementation<br>Perform and teach basic practical procedures in the newborn<br>Design management plans for babies presenting in the neonatal period with problems<br>Assess fluid status and adjust fluid management<br>Prescribe safely for newborn babies and breastfeeding mothers<br>Recognize the life-threatening nature of some situations and the need to call for help or look for personal support<br>Provide appropriate support for families with babies with neonatal problems<br>Explain to parents the long-term sequelae of prematurity and low birth weight<br>Plan for the management of any neonatal abstinence syndrome<br>Decide on appropriate referrals for transfer to other units, communicate effectively with all involved and maintain care as safely as possible until transfer team takes over<br>Initiate the involvement of a multidisciplinary team<br>Make a timely and appropriate referral to the multidisciplinary team<br>Refer appropriately to community services before discharge and begin to participate in the follow up of those at risk<br>Define the follow-up programs for those at risk<br>Observe examples of the effect of developmental difficulties on families<br>Describe the impact of developmental delay on families<br>Coordinate effectively with specialists |
| **Resuscitation**<br>By the end of training, a resident should: | |

## *Critical Care in Neonates*

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| History | Know the statistics for outcomes of birth depression<br>Know the goals of resuscitation<br>Know the use of appropriate narcotics during delivery and to what extent they will affect the baby<br>Be able to:<br>Anticipate high risk deliveries by a review of the perinatal history<br>Describe the physiology of resuscitation and response to it |
| Physical | Be able to:<br>Apply the guidelines for neonatal resuscitation and propose an “integrated” assessment/response approach<br>Recognize the implications of meconium staining of amniotic fluid |
| Diagnosis | Be able to:<br>Interpret fetal monitoring<br>Identify newborns in need of NICU admission |
| Management | Be able to:<br>Demonstrate competence in neonatal life support (through certification of satisfactory completion of a neonatal life support course)<br>Carry out proper and integrated ABC steps for resuscitation<br>Intubate full term and preterm babies without supervision<br>Properly use guidelines for endo-tracheal tube size and depth of insertion according to birth weight<br>Initiate and maintain conventional mechanical ventilation<br>Describe the proper pressure of lung inflation in a newborn and assessment of its adequacy and possible causes of poor response to mechanical ventilation<br>Anticipate neonatal affected by maternal narcotics and implement appropriate management<br>Insert umbilical arterial and venous catheters |

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| | Recognize secondary complications of neonatal resuscitation and initiate appropriate management |
| Ventilation | |
| Management | Know that the initial lung inflation may require increased pressure for the first breath<br>Be aware of the complications of ventilation<br>Be able to:<br>Recognize when a normal newborn infant has established regular respirations by 1 minute of age<br>Provide immediate positive-pressure ventilation for a newborn infant who has a slow heart rate and impaired respiratory effort<br>Describe the need to establish a patent airway before applying positive-pressure ventilation<br>Correctly identify the different ventilator parameters<br>Identify the best mode of ventilation for the condition of the baby<br>Provide immediate management of ventilation complications<br>Provide adequate nutrition support in a baby receiving assisted ventilatory support<br>Apply infection prevention measures during ventilation<br>Identify and correct the cause of inadequate ventilation |
| Suctioning | |
| Management | Be able to:<br>Visualize a newborn infant's larynx and suction the trachea if thick or particulate meconium is present in the amniotic fluid and the infant is not vigorous |
| Perfusion | |
| Management | Be able to:<br>Identify the indications for external cardiac massage of a newborn infant during resuscitation (eg, heart rate does not increase above 60 beats/min after effective ventilation with oxygen has been established)<br>Perform proper external cardiac massage in a newborn infant |

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| | Describe the metabolic consequences of continued poor perfusion in a newborn infant<br>Identify indications of introduction of emergency drugs<br>Monitor closely for signs of multi-organ failure |
| **Major patterns of malformations**<br>By the end of training, the resident should: | |
| History | Know the major types of congenital anomalies that can be present in the neonatal period<br>Know the manifestations of common life threatening congenital anomalies |
| Physical | Be able to:<br>Conduct a thorough and complete examination of the newborn<br>Identify common presentations of congenital cardiac disease, renal, cranial, eye and ear malformations<br>Assess blood pressure, heart murmurs, cyanosis, respiratory distress, scaphoid or distended abdomen |
| Diagnosis | Understand the role of maternal fetal medicine<br>Be able to:<br>Utilize proper imaging and investigation assessments<br>Diagnose common syndromes<br>Order appropriate diagnostic imaging studies (eg, X-rays, echocardiogram, abdominal and cranial ultrasound)<br>Determine if genetic testing is warranted<br>Insert a nasogastric tube to rule out conditions such as choanal atresia and tracheoesophageal fistula with esophageal atresia<br>Describe the common diagnoses and the likely prognosis of minor congenital anomalies |
| Management | Be able to:<br>Determine which congenital malformations need urgent action<br>Refer to the appropriate specialist or services needed |

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| | Counsel and advice parents appropriately<br>Refer appropriately to parent support group and to community services before discharge |
| **Neonatal birth injuries and trauma**<br>By the end of training, the resident should: | |
| History | Know pre-partum, intra-partum and during birth predisposing risk factors for neonatal birth injuries<br>Know the different types of birth injuries in neonates and their relative incidence<br>Know the outcomes of different birth injuries (both short and long term) |
| Physical | Be able to:<br>Identify/rule out different patterns of birth injuries in a systematic routine neonatal examination<br>Recognize birth injuries that require immediate intervention<br>Differentiate between birth injuries and normal neonatal findings (eg, Mongolian spots, caput succedaneum, face presentation, molding) |
| Diagnosis | Be able to:<br>Perform a thorough neonatal and neurological assessment of a newborn<br>Select the appropriate imaging modality for diagnosing injuires (ie, roentgenography, ultrasound, MRI, CT scans)<br>Identify extremity fracture if the neonate is not using affected limb, painful passive movement, and/or absent Moro reflex in limb<br>Identify self-limiting and spontaneously resolving birth injuries (eg, cephalhematoma)<br>Determine the severity of intracranial/intraventricular hemorrhage using ultrasound diagnostic criteria |
| Management | Understand the prognosis and the outcomes of different birth injuries<br>Be able to:<br>Perform appropriate procedures (eg, evacuation of pneumothorax in emergency)<br>Formulate management plan to prevent secondary damage (eg, phototherapy in large cephalhematoma to |

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| | ameliorate hyperbilirubinemia)<br>Coordinate and lead transfer appropriately<br>Describe the indications of referral to a specialist (eg, neurosurgeon, neurologist, physiotherapist) |
| **Very low birth weight infant**<br>By the end of training, the resident should: | |
| History | Know the causes of premature birth and the factors related to low birth weight<br>Know that very low birth weight rate is an accurate indicator of mortality and morbidity rate<br>Know the risk factors associated with small for gestational age or intrauterine growth restriction<br>Understand the neonatal problems associated with premature infants |
| Physical | Be able to:<br>Assess the gestational age at birth<br>Examine different systems for anomalies and signs of prematurity<br>Perform Apgar test and interpret scores |
| Diagnosis | Be able to:<br>Differentiate between low birth weight, very low birth weight, prematurity and intrauterine growth restriction<br>Analyze the growth chart and correlate growth aberrance with morbidity and mortality<br>Interpret newborn monitoring data<br>Select the proper laboratory tests and different imaging modalities needed<br>Analyze the sepsis profile |
| Management | Be able to:<br>Plan the initial and maintenance care of very low birth weight infants (eg, maintenance of a thermo neutral environment, monitoring of blood glucose and arterial oxygen concentrations, calculation and maintenance |

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| | of fluid requirements, initiation of feeding, and sepsis control)<br>Apply appropriate method of oxygen therapy<br>Recognize the immaturity of drug metabolism<br>Manage complications<br>Design a plan for the discharge of high-risk low-birth weight infants<br>Organize home care if needed<br>Identify prognostic factors related to VLBW and counsel parents appropriately |
| **Hypoxia, ischemia, and asphyxia**<br>By the end of training, the resident should: | |
| History | Know the various disorders that can produce fetal hypoxia<br>Understand that prevention of Hypoxic Ischemic Encephaolopathy (HIE) is critical<br>Be aware that HIE is the most frequent cause of neonatal seizures in a full-term infant<br>Know that intrapartum asphyxiation can cause injury to multiple organ systems (eg, kidney, lung, intestine, liver, brain, heart and blood)<br>Be able to:<br>Describe the multi-organ systemic effects of asphyxia<br>Identify the cause and the effects of after-birth hypoxia on neonates<br>identify the short and long term outcomes related to hypoxic ischemic encephalopathy (HIE)<br>Discuss the pathophysiology and pathology of hypoxia-ischemia in neonates |
| Physical | Be able to:<br>Detect early signs of fetal hypoxia as variable or late decelerations or acidosis before and during delivery<br>Detect meconium stained amniotic fluid at delivery<br>Perform Apgar test at 1, 5, and 10 minutes post-partum |

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| | Identify neonatal seizures secondary to HIE, which characteristically occur within 24 hours of birth<br>Perform the initial evaluation of a newborn and score the stage of HIE |
| Diagnosis | Be able to:<br>Differentiate between anoxia, hypoxia, and ischemia<br>Recognize the value and limitations of neurodiagnostic imaging modalities in diagnosing HIE in full term and preterm babies<br>Appropriately order or use the different modalities of early and continuous EEG to determine the risk for significant brain damage |
| Management | Know that the outcome of HIE ranges from complete recovery to death depending on gestational age, severity of encephalopathy, and associated complications<br>Be able to:<br>Recognize and initiate management to prevent secondary damage<br>Initiate acute management for HIE with reference to systemic and/or selective cerebral hypothermia<br>Identify and initiate management of organ system dysfunction<br>Prescribe the proper dosage of anticonvulsant therapy<br>Describe the potential long term sequelae of HIE<br>Identify the appropriate time to seek help from others and indications of referral to specialists<br>Differentiate between brain death and severe depression<br>Define when to refer to ethical committee<br>Communicate information to parents |
| **Neonatal seizures or abnormal neurologic status**<br>By the end of training, the resident should: | |
| History | Know the common causes of neonatal seizures |

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| | Understand the prognosis of abnormal neurologic status |
| Physical | Be able to:<br>Perform a neonatal neurologic assessment |
| Diagnosis | Understand the value and limitations of neurodiagnostic techniques such as MRI, CT, ultrasonography, EEG, and evoked potentials<br>Be able to:<br>Classify the clinical types of neonatal seizures<br>Correlate the clinical seizures with the EEG<br>Develop a differential diagnoses of seizures<br>Refer for retinal examination<br>Perform lumbar puncture<br>Select proper laboratory investigations |
| Management | Be able to:<br>Initiate management of seizures<br>Communicate bad news to parents |
| **Floppy baby**<br>By the end of training, the resident should: | |
| History | Know the common causes of a floppy baby |
| Physical | Be able to:<br>Perform a neonatal neurologic assessment |
| Diagnosis | Be able to:<br>Classify the clinical types of floppy baby<br>Develop a differential diagnoses of floppy baby |

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| | Order appropriate investigations including laboratory and neuro-imaging studies<br>Refer to appropriate specialists (eg, pediatric neurologist, genetics, metabolic) |
| Management | Be able to:<br>Initiate management of a floppy baby<br>Communicate management plans to parents |
| **Polycythemia, hyperviscosity**<br>By the end of training, the resident should: | |
| History | Know the diseases associated with polycythemia in the neonatal period<br>Know that newborn infants with polycythemia are at risk for hypoglycemia, hyperbilirubinemia, and intracranial insult<br>Know the causes of abnormal coagulation<br>Be able to:<br>Discuss the adverse outcomes of polycythemia in the newborn<br>Define polythythemia of the newborn |
| Physical | Be able to:<br>Recognize the major clinical manifestations of polycythemia in the neonatal period (eg, irritability, lethargy, tachypnea, respiratory distress, cyanosis, hyperbilirubinemia, hypoglycemia, and thrombocytopenia) |
| Diagnosis | Be able to:<br>Interpret coagulation profile in the newborn |
| Management | Be able to:<br>Perform partial exchange transfusion with normal saline in the newborn<br>Calculate the volume of the exchange fluids<br>Formulate a plan to manage the adverse outcomes of polythycemia (eg, hyperbilirubinemia, hypoglycemia or |

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| | intracranial conditions)<br>Advise for follow up care |
| **Neonatal jaundice** (see ***Neonatal Care***) | |

| **Intraventricular hemorrhage (IVH) and periventricular leukomalacia (PVL)**<br>By the end of training, the resident should: | |
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| History | Know the overall incidence of intraventricular hemorrhage (IVH)<br>Understand the causes of IVH<br>Know the pathogenesis of IVH<br>Know that risk for IVH is inversely related to gestational age and birth weight<br>Be able to:<br>Identify risk factors for IVH |
| Physical | Be able to:<br>Recognize clinical findings that are highly variable from no clinical manifestation to severe deterioration<br>Recognize non-specific clinical signs, which account for the majority of signs |
| Diagnosis | Know the prognosis and sequelae of IVH<br>Be able to:<br>Suspect IVH on the basis of history, physical examination, and birth weight specific risk factors<br>Recognize the clinical and laboratory findings associated with IVH in a neonate<br>Screen for IVH in all premature neonates < 32 wks gestation using cranial ultrasound<br>Interpret and define the severity of IVH by cranial ultrasound<br>Recognize complications associated with IVH (eg, post-hemorrhagic hydrocephalus)<br>Appraise peri-ventricular injury and predict the adverse long term outcome using diagnostic imaging (eg, |

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| | Cranial Ultrasound, Brain MRI) |
| Management | Be able to:<br>Recognize that improving perinatal care and managing maternal conditions at risk for IVH or prematurity will minimize poor outcomes<br>Plan management for IVH<br>Refer to neurosurgeon for consultation and management of post-hemorrhagic hydrocephalus (ie, CSF reservoir, ventriculo-peritoneal or ventriculo-subgaleal shunt)<br>Arrange follow up for suspected chronic neurologic condition with appropriate specialist/health care team |
| **Other Intracranial hemorrhage (including subarachnoid hemorrhage and subdural hemorrhage)**<br>By the end of training, the resident should: | |
| History | Know that primary subarachnoid hemorrhage is the most common form of intracranial hemorrhage<br>Know the pathogenesis of subdural hemorrhage, mainly those of traumatic origin (eg, tentorial tears with rupture of straight sinus, vein of Galen or small afferent veins)<br>Know the pathogenesis of posterior fossa subdural hemorrhage (eg, following excessive head moulding; excessive traction on skull of a baby in breech position)<br>Be able to:<br>Identify risk factors for IVH |
| Physical | Be able to:<br>Recognize clinical findings associated with subdural hemorrhage |
| Diagnosis | Be able to:<br>Identify subdural hemorrhage on the basis of history and physical examination.<br>Confirm the diagnosis of subdural hemorrhage using brain MRI/CT scan |
| Management | Be able to:<br>Refer to neurosurgeon for consultation and management |

| **Respiratory distress syndrome (RDS)**<br>By the end of training, the resident should: | |
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| History | Know the contributing factors in the pathogenesis of hyaline membrane disease/RDS<br>Know the incidence of RDS in relation to prematurity and low birth weight<br>Know the causes of mortality in neonatal RDS<br>Understand the pathophysiology of RDS<br>Be able to:<br>Define the normal arterial blood gas values for a newborn infant<br>Recognize neonatal and maternal conditions in the perinatal period associated with increased incidence of RDS and others associated with decreased incidence of RDS |
| Physical | Be able to:<br>Identify the onset of signs of RDS as early as possible<br>Identify the consequences of improperly managed RDS<br>Recognize signs of respiratory failure as a possible complication of RDS |
| Diagnosis | Be able to:<br>Interpret blood gases<br>Interpret chest radiography findings and identify the characteristic radiographic appearances<br>Formulate the differential diagnosis of RDS<br>Order appropriate laboratory investigations to rule out complications (eg, chest x-ray to rule out air leaks)<br>Recognize that further investigation (eg, ECHO cardiograph) may be needed<br>Obtain, interpret, and act properly on blood gases results<br>Interpret chest radiography and act on results<br>Differentiate between RDS, severe wet lung disease, congenital pneumonia (eg, Group B Streptococcus |

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| | pneumonia) and aspiration syndromes (eg, meconium aspiration) |
| Management | Know the guidelines for the use of surfactant therapy and its administration<br>Be familiar with role of maternal intake of corticosteroids<br>Be familiar with fetal monitoring data<br>Be familiar with different modes of ventilation and types of ventilators (conventional to high frequency)<br>Be able to:<br>Determine indications for the use of prophylactic surfactant<br>Conduct supportive care regarding adequate caloric intake, thermoregulation, correction of acidosis hypoxia, and proper clinical and laboratory monitoring<br>Insert umbilical arterial and venous catheters<br>Initiate and maintain adequate respiratory support<br>Initiate and stabilize conventional ventilation<br>Apply the best mode of ventilation for the condition of the newborn<br>Identify the pharmacologic options available for the treatment of RDS and prevention of its complications<br>Identify appropriate sedatives used for mechanically ventilated infants<br>Prevent and control infection<br>Prevent and properly manage possible complications associated with intubation, mechanical ventilation, and/or umbilical catheterization<br>Recognize when response to management is not optimal and request help from senior colleagues or other services (neonatal-perinatal medicine) |
| **Apnea**<br>By the end of training, the resident should: | |
| History | Know that apnea presents as the earliest sign of widely variant neonatal illnesses |

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| | Know that the incidence of idiopathic apnea of prematurity varies inversely with gestational age<br>Be able to:<br>Differentiate between types of apnea (eg, central, obstructive)<br>Identify potential causes of neonatal apnea and bradycardia<br>Define apnea and differentiate it from physiological periodic breathing observed in neonates |
| Physical | Understand the relationship between apnea, bradycardia, and oxygen de-saturation<br>Be able to:<br>Carry out a complete neonatal examination, focusing on the differential diagnoses of neonatal apnea |
| Diagnosis | Be able to:<br>Order the proper laboratory investigations needed to diagnose the causes of apnea<br>Recognize that the increase in frequency of apnea in a preterm infant, or apnea in a full term at any time, is a critical event that warrants immediate investigation |
| Management | Be able to:<br>Plan and initiate management of apnea ranging from simple tactile stimulation to continuous positive airway pressure and pharmacological therapies<br>Introduce continuous positive airways pressure (CPAP) when indicated<br>Identify need and duration of monitoring for a neonate with apnea<br>Determine the prognosis for apneic infants |
| **Acute respiratory failure including ventilatory support**<br>By the end of training, the resident should: | |
| History | Be able to:<br>Define the possible causes of respiratory failure<br>Describe the classification and pathophysiology of respiratory failure |

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| Physical | Be able to:<br>Perform a thorough physical examination of the infant in respiratory failure<br>Identify possible causes of respiratory failure<br>Anticipate respiratory failure as early as possible |
| Diagnosis | Be able to:<br>Perform proper clinical evaluation and monitoring of newborn<br>Perform and interpret arterial blood gases<br>Select appropriate laboratory and radiology examination to identify the cause of respiratory failure<br>Detect correctable causes of respiratory failure by close monitoring as early as possible |
| Management | Know the indications for use of inhaled nitric oxide and ECMO<br>Be able to:<br>Insert endotracheal tube when indicated<br>Provide respiratory care according to neonatal condition ranging from nasal oxygen, CPAP, intubation, and/or mechanical ventilation<br>Monitor and provide systemic supportive care according to the infant's condition<br>Administer surfactant when indicated |
| **Extrapulmonary air leaks (pneumothorax, pneumomediastinum, pulmonary interstitial emphysema, pneumopericardium)**<br>By the end of training, the resident should: | |
| History | Understand the pathophysiology of air leaks<br>Know that pulmonary air leaks (eg, pulmonary interstitial emphysema, pneumomediastinum and pneumothorax) may occur in newborn infants who are treated with assisted ventilation |
| Physical | Be able to:<br>Recognize the characteristic clinical appearance of pneumothorax, pneumomediastinum, and pulmonary |

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| | interstitial emphysema |
| Diagnosis | Be able to:<br>Interpret chest radiography<br>Transilluminate the thorax |
| Management | Be able to:<br>Determine indications for needle thoracentesis;<br>Perform needle thoracentesis to evacuate a pneumothorax Insert a chest tube and attach to underwater seal drainage or continuous suction<br>Refer urgently to cardiothoracic surgeon, cardiologist or neonatologist when a pneumopericardium is identified<br>Use sedation in an infant "fighting" a ventilator |
| **Meconium aspiration syndrome**<br>By the end of training, the resident should: | |
| History | Know the incidence of meconium aspiration syndrome and that only a small percent of babies require mechanical ventilation<br>Know the mortality and morbidity associated with meconium aspiration syndrome<br>Understand the pathophysiology of meconium aspiration syndrome<br>Know the perinatal risk factors associated with meconium aspiration syndrome<br>Know the complications associated with meconium aspiration and the high risk of pulmonary hypertension with meconium aspiration syndrome |
| Physical | Be able to:<br>Identify the association of fetal distress with meconium aspiration<br>Recognize signs of meconium aspiration syndrome<br>Classify meconium stained neonates into vigorous and non-vigorous |

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| | Identify partial obstruction of airways as this may lead to pneumomediastinum, pneumothorax, or both |
| Diagnosis | Be able to:<br>Identify the characteristic radiographic findings associated with meconium aspiration<br>Diagnose pulmonary hypertension and residual lung problems |
| Management | Be able to:<br>Perform early nasopharyngeal suction<br>Intubate and provide tracheal suctioning in a non-vigorous flaccid meconium-stained newborn<br>Recognize possible complications of intubation of a flaccid infant before the 1st breath<br>Plan the initial management of meconium aspiration syndrome<br>Plan the initial management of pulmonary hypertension |
| **Congenital pneumonia**<br>By the end of training, the resident should: | |
| History | Understand that pneumonia is an important cause of neonatal infection and accounts for significant morbidity and mortality<br>Understand the pathogenesis of early onset pneumonia and late onset pneumonia and possible organisms of both conditions |
| Physical | Be able to:<br>Obtain perinatal history to rule out intrauterine infection and amnionitis<br>Recognize the nonspecific signs of pneumonia (as most are nonspecific) |
| Diagnosis | Be able to:<br>Interpret chest radiography<br>Perform diagnostic work up for neonatal infection<br>Differentiate between viral, fungal, and bacterial pneumonia |

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| Management | Know that prognosis of neonatal pneumonia is predicated upon the severity of the disease, the gestational age of the baby, underlying medical conditions, the infecting organism, and the immune system of the newborn<br>Be able to:<br>Recognize that successful treatment depends upon early recognition of the infection and early therapy prior to the development of irreversible injury<br>Select empirical antibiotic treatment according to type of pneumonia (ie, early or late onset) until culture results<br>Plan the duration of therapy being guided by the infecting pathogen and the response of the baby |
| **Transient tachypnea of the newborn (wet lung disease)**<br>By the end of training, the resident should: | |
| History | Know the neonatal conditions likely to develop transient tachypnea<br>Understand the pathophysiology of transient tachypnea |
| Physical | Be able to:<br>Identify onset of tachypnea and timing of its recovery<br>Observe improvement of tachypnea with less than 40% oxygen administration |
| Diagnosis | Be able to:<br>Identify and interpret radiological findings of transient tachypnea<br>Differentiate transient tachypnea from respiratory distress syndrome<br>Recognize the distinctive features of transient tachypnea and its complications<br>Identify the pathophysiology of transient tachypnea |
| Management | Be able to:<br>Implement supportive measures used in the treatment of transient tachypnea |
| **Tracheoesophageal fistula (TEF)**<br>By the end of training, the resident should: | |

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| History | Know the different types of TEF<br>Know that 50% of newborns with TEF have the VACTERL syndrome (vertebral, anorectal, cardiac, tracheal, esophageal, renal, radial, limb syndrome) |
| Physical | Be able to:<br>Search for esophageal atresia in babies born to mothers with polyhydraminos<br>Recognize frothing and bubbling (typical findings) in a neonate with esophageal atresia after birth<br>Differentiate clinical findings according to the type of TEF, ranging from respiratory distress and cyanosis after birth to chronic respiratory problems, and recurrent aspiration/pneumonias later in life |
| Diagnosis | Be able to:<br>Insert nasogastric tube and recognize the presence of coiled tube in presence of esophageal atresia<br>Interpret plain chest and abdomen radiograph<br>Interpret esophagogram<br>Refer for endoscopy and know that methylene blue dye injection in the endotracheal tube during endoscopy in diagnostic for isolated TEF |
| Management | Know complications associated with TEF<br>Be able to:<br>Maintain patent airway and prevent aspiration of secretions<br>Position the baby properly<br>Refer to surgeon to select the type and time of the surgery |
| **Congenital Diaphragmatic Hernia (CDH)**<br>By the end of training, the resident should: | |
| History | Know that CDH is associated with persistent pulmonary hypertension<br>Know that subsequent abnormalities include poor growth, tracheomalacia, and developmental delay |

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| Physical | Be able to:<br>Recognize the clinical manifestation of CDH |
| Diagnosis | Be able to:<br>Diagnose a diaphragmatic hernia with a chest radiograph |
| Management | Know complications associated with CDH<br>Be able to:<br>Commence appropriate initial therapy for a newborn with CDH<br>Conduct initial stabilization maneuvers for a newborn with CDH<br>Refer to surgeon for surgery |
| **Persistent pulmonary hypertension of newborns (PPHN), persistent fetal circulation**<br>By the end of training, the resident should: | |
| History | Know the hemodynamics and physiology of fetal circulation<br>Understand the pathophysiology of pulmonary hypertension in the newborn<br>Be able to:<br>Describe the physiological changes in the fetal circulation taking place during the immediate perinatal period<br>Identify risk factors predisposing to PPHN<br>Obtain proper perinatal history and results of antenatal investigations to diagnose PPHN and its etiology |
| Physical | Be able to:<br>Rule out/diagnose causes of PPHN in a systematic routine examination<br>Detect early myocardial ischemia and manage promptly<br>Distinguish multiorgan failure and initiate a management plan accordingly |
| Diagnosis | Know that echocardiography is the investigation of choice to diagnose PPHN<br>Be able to: |

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| | Formulate the differential diagnosis<br>Interpret chest radiography |
| Management | Be aware of the indications for nitric oxide and ECMO(extra-corporeal membrane oxygen) therapies<br>Be able to:<br>Formulate a management plan with the appropriate specialists (eg, neonatologists, pediatric cardiologists)<br>Initiate the necessary lines of treatment including calculating doses of pharmacological therapy, mechanical ventilation, and use of inhaled nitric oxide |
| **Cyanosis (non-respiratory)** (see also ***Cardiology***)<br>By the end of training, the resident should: | |
| History | Understand the anatomy and implications of cyanotic congenital heart disease |
| Physical | Know that different skin colors and races affect appearance of cyanosis<br>Be aware that peripheral cyanosis is a common finding in healthy full-term newborn infants<br>Be able to:<br>Differentiate between central and peripheral cyanosis |
| Diagnosis | Be able to:<br>Formulate the differential diagnosis of cyanosis in the newborn in a systemic pattern (eg, CNS, respiratory, cardiac, methemoglobinemia, artifactual)<br>Select appropriate imaging and laboratory investigations<br>Measure bedside oxygen saturation<br>Order an echocardiogram to confirm the diagnosis |
| Management | Be able to:<br>Initiate supportive treatment<br>Formulate a treatment plan according to the causes of cyanosis |

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| | Initiate appropriate consultations (eg, cardiology) |
| **Bronchopulmonary dysplasia (BPD)/chronic lung disease(CLD)**<br>By the end of training, the resident should: | |
| History | Know the factors associated with an increased risk of CLD<br>Know the causes of respiratory distress that require prolonged oxygen therapy<br>Know the definitions of BPD/CLD<br>Know the morbidities associated with BPD/CLD<br>Be able to:<br>Undertake a proper structured neonatal history including the gestational age of the neonate, and the amount and duration of oxygen administration<br>Anticipate BPD with prolonged ventilation especially with high settings<br>Describe the histopathology of BPD |
| Physical | Be able to:<br>Evaluate a patient with continuing oxygen dependence |
| Diagnosis | Be able to:<br>Interpret chest radiography<br>Diagnose right sided heart failure in patients developing pulmonary hypertension |
| Management | Be able to:<br>Perform proper weaning from assisted respiratory support (ventilation/CPAP)<br>Provide supportive care (eg, nutrition, fluid requirements, and infection control)<br>Determine the indications for use of inhaled bronchodilators and/or inhaled steroids |
| **Sepsis (including meningitis)**<br>By the end of training, the resident should: | |

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| History | Know the risk factors for neonatal sepsis (eg, premature and prolonged rupture of membranes, chorioamnionitis)<br>Know the risk factors for nosocomial sepsis (eg, intravascular catheters, endotracheal tubes)<br>Know that hospital-acquired nosocomial infections are responsible for significant morbidity and late mortality in hospitalized newborns<br>Be able to:<br>Conduct a structured history focusing on the screening tests and appropriate treatment of infected mothers<br>Describe the epidemiology, risk factors, and pathogens causing sepsis in a neonate<br>Understand the pathogenesis of intrauterine infection<br>Obtain an adequate perinatal history focusing on risk factors for neonatal sepsis<br>Recognize early signs of neonatal sepsis (eg, poor feeding, lethargy, and temperature instability)<br>Recognize that neonatal pneumonia can mimic respiratory distress syndrome<br>Differentiate between early and late-onset neonatal sepsis |
| Physical | Be able to:<br>Detect initial signs of neonatal sepsis<br>Identify clinical criteria for the diagnosis of sepsis including the IMCI (Integrated Management of Childhood Illnesses) criteria<br>Differentiate between sepsis and other conditions of the neonatal period mimicking its presentation |
| Diagnosis | Be able to:<br>Anticipate early signs of sepsis and initiate appropriate anti-microbial therapy and supportive management<br>Evaluate repeated laboratory investigations and bacterial cultures<br>Perform lumbar puncture as appropriate |
| Management | Understand the value of using intrapartum antibiotics to reduce vertical transmission of *Group B streptococcus* and lessen neonatal morbidity after preterm rupture of membranes |

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| | Understand the importance of timely treatment, the duration of treatment with antibiotics, the range of antibiotics that can be used, and the likely pathogens<br>Be able to:<br>Initiate empirical treatment of early-onset bacterial infections<br>Define the appropriate antibiotic treatment for suspected sepsis in the immediate newborn period and the proper supportive care<br>Practice the principles of infection prevention in the newborn nursery, special care baby unit and neonatal intensive care unit |
| **TORCH infections (including HIV)**<br>By the end of training, the resident should: | |
| History | Know that TORCH infection may be asymptomatic<br>Know that perinatal infection with cytomegalovirus may be acquired in utero, during delivery, or in the neonatal period (eg, breast milk, blood transfusion) |
| Physical | Be able to:<br>Search for TORCH infection in presence of intra-uterine growth retardation or CNS signs after delivery<br>Perform structured examination for different systems to detect clinical manifestations of transplacental infections |
| Diagnosis | Be able to:<br>Interpret the results of immunoglobulin levels for different organisms<br>Select other laboratory investigations to form differential |
| Management | Know that intrauterine infection may be prevented through maternal immunization before pregnancy<br>Be able to:<br>Initiate treatment for the organism if available<br>Refer to proper specialist (eg, infectious disease) or community services (ie, public health agency) |

| **Neonatal Necrotizing Enterocolitis (NEC)**<br>By the end of training, the resident should: | |
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| History | Know the pathogenesis and pathology of NEC<br>Know that the incidence and mortality rates increase with decreasing birth weight and gestational age<br>Know that the severity is inversely related to gestational age |
| Physical | Be able to:<br>Recognize that the spectrum of signs are nonspecific and can range from abdominal distension and gastric residuals, to perforation, peritonitis, shock, and death<br>Identify the signs associated with NEC |
| Diagnosis | Know that the investigations of choice are abdominal radiographs<br>Know that abdominal ultrasound scan may be helpful in assisting with the diagnosis<br>Know the radiologic findings associated with NEC<br>Be able to:<br>Interpret the supine plain abdominal radiography<br>Formulate a differential diagnosis |
| Management | Be able to:<br>Initiate therapy in suspected cases<br>Give the proper supportive care and prevent further injury<br>Monitor the patient's different systems (eg, GI, CVS, respiratory, hematology, renal) and initiate support when necessary<br>Determine the indications for surgery and the role of peritoneal drainage<br>Refer to surgeon at appropriate time<br>Recognize the complications of NEC and manage accordingly |

| **Intestinal obstruction**<br>By the end of training, the resident should: | |
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| History | Know that maternal polyhydraminos frequently accompanies high intestinal obstruction<br>Be able to:<br>Describe the different types of intestinal obstruction including intrinsic and extrinsic lesions resulting in complete or incomplete obstruction |
| Physical | Know that the clinical findings vary according to the level of obstruction<br>Be able to:<br>Identify general signs including abdominal distension, bilious gastric aspirates, vomiting and constipation<br>Identify late presentation as sepsis, toxemia or even peritonitis and perforation |
| Diagnosis | Know that intestinal obstruction can be a finding associated with cystic fibrosis<br>Be able to:<br>Interpret radiological and laboratory findings<br>Initiate diagnostic evaluation for cystic fibrosis<br>Identify pyloric stenosis, malrotation and volvulus using diagnostic imaging techniques (eg,abdominal ultrasound)<br>Differentiate between meconium plug and intestinal obstruction |
| Management | Know that a gastrografin enema can be performed to relieve meconium plug<br>Be able to:<br>Stabilize a patient using fluid resuscitation<br>Insert a nasogastric tube to decompress the stomach<br>Irrigate the rectum with saline for meconium plug<br>Administer broad spectrum antibiotics for ill appearing neonates |

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| | Refer to the surgeon in a timely manner<br>Recognize the sequelae of undiagnosed or neglected intestinal obstruction |
| **Intrauterine growth restriction (IUGR) and other nutritional problems**<br>By the end of training, the resident should: | |
| History | Know that maternal, placental, and fetal factors influence fetal growth<br>Know the causes of IUGR and growth restricted babies<br>Understand and begin to address poor postnatal growth<br>Understand the importance of nutrition in sick babies |
| Physical | Be able to:<br>Determine if a baby is symmetrically or asymmetrically growth restricted |
| Diagnosis | Be able to:<br>Use appropriate growth charts to diagnose growth restriction |
| Management | Know that fluid needs vary according to the gestational age, environmental, and pathological conditions<br>Be able to:<br>Support breast milk intake at all gestational ages<br>Insert gavage tube and initiate enteral feeding<br>Prescribe appropriate nutrition supplements<br>Understand the principles of parentral nutrition<br>Define the indications, goals, volume, content, and complications of total parenteral nutrition |
| **Abdominal-intestinal wall defect**<br>By the end of training, the resident should: | |
| History | Know the possible associated anomalies or syndromes<br>Be able to: |

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| | Describe the etiology/embryology of different types of abdominal wall defects (eg, congenital omphaloceles, gastrochisis) |
| Physical | Be able to:<br>Perform thorough neonatal examination to detect any associated anomalies |
| Diagnosis | Be able to:<br>Differentiate between different types of abdominal intestinal wall defect<br>Detect associated congenital anomalies or syndromes |
| Management | Be able to:<br>Prevent infection and rupture of the intestine<br>Plan and initiate the required steps for newborn's stabilization including fluid balance<br>Prevent dryness of the exposed intestine<br>Refer to appropriate surgeon<br>Formulate management plan for associated anomalies |
| **Infants affected by maternal disorders**<br>By the end of training, the resident should: | |
| History | Know the maternal illnesses affecting the fetus and the newborn<br>Understand the pathophysiology of the maternal disorder<br>Know the agents acting on pregnant women that may affect the fetus and the newborn<br>Be able to:<br>Obtain a structured perinatal history focused on maternal illness and any medications she received during pregnancy |
| Physical | Be able to:<br>Perform a full neonatal examination targeting the suspected abnormalities based on maternal illness |

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| Diagnosis | Be able to:<br>Select, initiate, and interpret proper diagnostic modalities both laboratory or imaging according to the expected abnormality<br>Identify the life threatening problems (eg, hypoglycemia in infant diabetic mother) |
| Management | Be able to:<br>Plan and initiate the management of a newborn whose mother has disorders that can affect the fetus or the newborn<br>Anticipate problems early and manage appropriately |
| **Anemia (hemolytic anemia including blood group incompatibility)**<br>By the end of training, the resident should: | |
| History | Know the normal level of hemoglobin in term, preterm, and LBW neonates<br>Know different types of anemia and the time of presentation (early or late)<br>Understand the pathophysiology of hemolytic anemia<br>Know the causes of hydrops fetalis |
| Physical | Know that the clinical presentation varies from mild pallor to severe respiratory distress, marked pallor, and cardiac de-compensation<br>Be able to:<br>Identify signs of hemolysis as jaundice in first day after birth and marked pallor<br>Identify cardiomegaly and other signs of hydrops fetalis |
| Diagnosis | Know that antenatal and fetal assessment is important in the diagnosis of erythroblastosis fetalis<br>Be able to:<br>Interpret a complete blood count in a newborn<br>Order and interpret the reticulocytic count and perform further hemolytic profile in case of reticulocytosis |

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| | Follow the guidelines for diagnostic approach to anemia in newborn infants |
| Management | Know about antenatal treatment of hemolytic anemia<br>Know about indications for the use of recombinant human erythropoietin in anemia of prematurity<br>Know the indications for blood transfusion<br>Be able to:<br>Perform exchange transfusion in a baby with severe hemolysis<br>Administer oral iron in anemia of prematurity |
| **Multiple congenital anomalies** (see also ***Genetics***)<br>By the end of training, the resident should: | |
| History | Be aware of the causes of congenital anomalies<br>Be aware of the molecular mechanisms of malformations<br>Be able to:<br>Classify congenital malformations and dysplasias<br>Obtain a detailed family history and a pedigree from the parents<br>Obtain a perinatal history |
| Physical | Be able to:<br>Identify common clinical signs of congenital malformation<br>Perform an organized and systematic examination to catalog physical parameters and findings<br>Differentiate between minor and major malformations |
| Diagnosis | Understand the use of antenatal diagnosis and the role of maternal fetal medicine<br>Understand the value and limitation of imaging studies<br>Be able to:<br>Utilize the laboratory tests necessary to confirm a diagnosis |

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| | Identify the indication for karyotype (and/or microarray) analysis<br>Integrate all data available to reach a diagnosis |
| Management | Know the role of maternal fetal medicine and intrauterine interventions that are available<br>Understand the impact on parents of the birth of a baby with serious congenital abnormalities or potential disabilities and the ensuing grief due to loss of the expected normal child<br>Be able to:<br>Respond to parents' immediate questions and counsel appropriately<br>Refer for genetic counseling and/or other appropriate specialists or services |
| **Deformations (amniotic bands, positional deformations)**<br>By the end of training, the resident should: | |
| Amniotic bands | |
| Physical | Know that clinical manifestation can range from asymptomatic to ring constriction that may lead to amputation of extremities<br>Be able to:<br>Identify possible disease(s) associated with amniotic bands |
| Congenital/acquired hydrocephalus | |
| History | Know the causes, classifications, and clinical types of hydrocephalus<br>Understand the physiology and circulation of CSF |
| Physical | |
| Diagnosis | Understand that early diagnosis is correlated with prognosis<br>Be able to:<br>Initiate appropriate investigations to confirm the diagnosis (eg, cranial ultrasound/Brain MRI) |
| Management | Be able to: |

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| | Refer to neurosurgery in the appropriate time<br>Plan follow up |
| Congenital hip dislocation/dysplasia (see also ***Musculoskeletal Disorders***) | |
| History | Be able to:<br>List the risk factors associated with congenital hip dysplasia |
| Physical | Be able to:<br>Apply Barlow/Ortolani maneuvers to screen all neonates for hip dysplasia |
| Diagnosis | Be able to:<br>Differentiate between types of hip dislocation |
| Management | Be able to:<br>Initiate investigations (eg, ultrasonography and radiography)<br>Refer to orthopedic surgery for management |
| Ambiguous genitalia (see also ***Endocrinology***) | |
| History | Be able to:<br>Obtain pertinent family history |
| Physical | Be able to:<br>Perform a thorough neonatal examination to exclude multisystem syndromes |
| Diagnosis | Be able to:<br>Order appropriate laboratory investigations and karyotyping<br>Order appropriate DI studies (eg, abdominal/pelvic ultrasound and/or MRI) to determine genital organ anatomy |
| Management | Be able to:<br>Evaluate and manage by a multidisciplinary team of experts including endocrinologists |

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| Abnormal skin findings (rashes, nevi, vascular malformations) (see ***Dermatology***) |

| **Retinopathy of prematurity (ROP)**<br>By the end of training, the resident should: | |
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| History | Understand the pathogenesis of retinopathy<br>Identify the risk factors associated with retinopathy<br>Know the risk factors, in particular the role of oxygen<br>Be able to:<br>Identify high risk preterm infants requiring retinal examination for retinopathy of prematurity |
| Physical | Know that examination of the fundi of premature infants can be difficult<br>Know the changes seen in the various stages of retinopathy of prematurity<br>Be able to:<br>Identify variable clinical features from myopia, cataracts, to complete blindness |
| Diagnosis | Be able to:<br>Follow the screening guidelines for ROP that include systematic serial ophthalmological examination |
| Management | Be aware of the International Classification of retinopathy of prematurity and its relationship to prognosis<br>Be able to:<br>Communicate with the ophthalmologist on the follow up plan<br>Prevent the occurrence of ROP by reducing the risk factors<br>Refer to ophthalmologist in a timely manner |

| **Hypothermia and cold injury**<br>By the end of training, the resident should: | |
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| History | Know that hypothermia can be the first clinical manifestation of many serious diseases in the neonatal period (eg, sepsis, CNS, cardiovascular disturbances) |

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| | Be able to:<br>Define the normal range of body temperature accepted in neonates and its variability depending on the gestational age<br>Describe the pathophysiology of cold injuries |
| Physical | Be able to:<br>Perform accurate measurement of temperature in a neonate<br>Conduct full neonatal examination efficiently, targeting the causes of hypothermia in a systematic manner |
| Diagnosis | Be able to:<br>Diagnose neonatal hypothermia early<br>Use incubators and/or radiant warmers in the NICU setting<br>Select and interpret the proper laboratory and imaging investigations according to the formulated differential diagnoses |
| Management | Be familiar with methods of normalization of body temperature in neonates<br>Know the indications for NICU admission<br>Be able to:<br>Prevent neonatal hypothermia |
| **Infant of Diabetic mother**<br>By the end of training, the resident should: | |
| History | Know that adequate maternal glycemic control before and during pregnancy improves neonatal outcomes<br>Know that maternal diabetes in pregnancy is associated with an increased risk for adverse outcomes including: polyhydramnios, preeclampsia, preterm labor, fetal mortality, and congenital anomalies in fetus<br>Understand the effects of maternal hyperglycemia on fetal pathophysiology including: fetal macrosomia, fetal hyperinsulinism, fetal acidosis<br>Understand the pathogenesis of hypoglycemia in infants born to diabetic mothers |

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| Physical | Be able to:<br>Conduct a complete neonatal examination, targeting the causes, signs, and complications affecting infants of diabetic mothers<br>Identify clinical signs related to hypoglycemia |
| Diagnosis | Be able to:<br>Identify hypoglycemia by assessing bed-side (point of care) blood glucose level and manage according to the most updated (recent) guidelines |
| Management | Be able to:<br>Prevent and correct hypoglycemia in an infant of a diabetic mother<br>Initiate immediate management to maintain constant normal serum glucose levels<br>Identify and manage complications of hypoglycemia<br>Identify and manage other complications arising in infants of diabetic mothers (eg, RDS, jaundice, polycythemia, cardiomegaly, hypocalcemia/hypomagnesemia, congenital anomalies) |
| **Hypoglycemia (including refractory hypoglycemia)**<br>By the end of training, the resident should: | |
| History | Know that glucose is the preferred substrate for cerebral energy metabolism and its utilization accounts for nearly all the oxygen consumption in brain<br>Understand the risk of the neurodevelopmental deficits consequent to hypoglycemia in preterm and full term babies<br>Know the factors that increase the incidence of hypoglycemia in neonates, with a special emphasis on infant of diabetic mother<br>Understand the pathogenesis of hypoglycemia in infants born to diabetic mothers<br>Know the value of the onset of hypoglycemia and its relation to the birth weight<br>Be able to:<br>Define hypoglycemia in a preterm and newborn infant |

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| | Obtain a structured perinatal history, including maternal illnesses and medications related to hypoglycemia |
| Physical | Be able to:<br>Conduct a complete neonatal examination, targeting the causes, signs, and complications of hypoglycemia in a systematic manner |
| Diagnosis | Be able to:<br>Assess bed-side (ie, point of care) blood glucose level and manage according to the most recent guidelines<br>Select and analyze the proper laboratory investigations according to the formulated differential diagnoses of hypoglycemia |
| Management | Be able to:<br>Prevent and correct hypoglycemia in an infant of a diabetic mother<br>Initiate immediate management to maintain constant normal serum glucose levels<br>Counsel mothers to enhance their breast feeding<br>Define and manage complications of hypoglycemia |
| **Patent ductus arteriosus (PDA)**<br>By the end of training, the resident should: | |
| History | Understand the pathophysiology of PDA<br>Know that VLBW infants with patent PDA are at increased risk of more severe RDS and BPD<br>Be able to:<br>Identify the factors that increase the risks of delayed closure of ductus arteriosus in neonates |
| Physical | Know that PDA may be asymptomatic or may present as apnea, hyperdynamic circulatory state, oxygen dependency, or carbon dioxide retention<br>Be able to:<br>Auscultate the heart and palpate the peripheral pulses for bounding pulses |

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| Diagnosis | Know that the investigation of choice to confirm the diagnosis is echocardiography<br>Be able to:<br>Interpret chest radiography |
| Management | Know the sequelae of symptomatic untreated PDA<br>Be able to:<br>Stabilize the patient by fluid restriction and diuretic therapy<br>Perform medical closure by indomethacin or ibuprofen therapy<br>Refer to the cardiothoracic surgeon for surgical PDA closure |
| **Comprehensive discharge planning and follow-up plans**<br>By the end of training, the resident should: | |
| History | Know the incidence of adverse outcome according to completed week of gestation at delivery<br>Know the outcomes for survival and factors influencing outcome<br>Be able to:<br>Identify a high risk pregnancy<br>Identify the factors associated with high risk pregnancy<br>Identify maternal conditions affecting the fetus and newborn |
| Physical | Be able to:<br>Recognize the factors influencing the perinatal and neonatal mortality |
| Diagnosis | |
| Management | Understand the relationship between successful outcomes and the timing of starting management<br>Understand the morbidities and sequelae of perinatal and neonatal illness<br>Be able to:<br>Define the level of in hospital perinatal care (eg, tertiary care) |

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| | Determine and explain the steps to successful breast-feeding<br>Ensure parent-infant bonding before discharge<br>Plan for discharge from intensive care or special care nurseries<br>Communicate with parents regarding discharge plans<br>Design a follow-up plan for parents<br>Ensure communication between parents and members of the multidisciplinary team |

| **The dying baby**<br>By the end of training, residents should: | |
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| Management | Be able to:<br>Demonstrate an understanding about terminal care and bereavement counseling<br>Apply ethical principles in withdrawing or withholding care in an infant<br>Communicate sympathetically with parents and clinical staff<br>Demonstrate an awareness of personal stress and recognize when to look for support |

| **High fever** (see also ***Infectious Diseases***)<br>By the end of training a resident should: | |
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| History | Understand the normal range of body temperature |
| Physical | Be able to:<br>Use the correct methods for measuring body temperature |
| Diagnosis | Be able to:<br>Develop a differential diagnosis of fever without localizing signs in children of varying ages |
| Management | Be able to:<br>Plan the management of children of varying ages with a high fever: local measures, medication, dosage |

| **Pain (unspecified, acute abdominal, etc.)** (see also ***Pharmacology***)<br>By the end of training, the resident should: | |
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| History | Know that pain can be a manifestation of several underlying etiologies |
| Physical | Be able to:<br>Effectively assess pain, ie, patient's degree of discomfort |
| Diagnosis | Be aware of objective and visual tools used to assess pain<br>Be aware of observational scoring systems for pain assessment in neonates and infants |
| Management | Know that the administration of pharmacologic assistance to relieve procedural pain is determined by clinical experience and anticipated duration of the procedure<br>Know the available options for pain management<br>Know the advantages and disadvantages of the different pharmacologic medications available<br>Understand that pain medication may mask signs that may be clinically significant<br>Be able to:<br>Determine the route and ease of administration |

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| | Monitor response to therapy including time of onset, duration of action, ability to titrate, and patient tolerance |

| **Acute respiratory distress and failure** (see also ***Critical Care in Neonates*** and ***Children*** and ***Respiratory***)<br>By the end of training, the resident should: | |
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| History | Know that acute respiratory distress or failure is a common cause of cardiopulmonary arrest in children<br>Know that respiratory failure arising from acute respiratory distress arises from derangements in pulmonary gas exchange including hypoventilation, diffusion impairment, intrapulmonary shunting, and ventilation-perfusion mismatch<br>Know that causes may be classified by age, anatomic lesions, abnormalities of chest wall, neuromuscular anomalies and CNS anomalies affecting respiratory drive<br>Be able to:<br>Take a focused history to aid diagnosis whilst also addressing the urgent clinical needs of the patient |
| Physical | Know that increased respiratory rate and effort (eg, tachypnea and dyspnea) suggest mechanical problems with the lung/chest<br>Know that neuromuscular disease may result in progressively weaker respiratory effort and eventually fatigue<br>Be able to:<br>Identify and accurately record the degree of respiratory distress |
| Diagnosis | Know that respiratory distress is a clinical diagnosis<br>Know that respiratory failure is defined as an inability to fulfill the gas exchange needs of the patient and is confirmed by diagnostic studies<br>Be able to:<br>Initiate appropriate investigations (eg, chest X-ray, blood gas, pulmonary function tests) |
| Management | Be able to:<br>Initiate therapy based on the cause of respiratory distress |

| **Diarrhea/vomiting and dehydration** (see also ***Gastroenterology and Hepatology***) | |
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| History | Know that diarrhea can result from overfeeding in an infant<br>Know that infectious etiologies in infants may be associated with bacteremia (eg, *salmonella* gastroenteritis)<br>Know that *rotavirus* is a common cause of profuse watery diarrhea and can rapidly result in dehydration<br>Know that diarrhea can be a nonspecific manifestation of a systemic illness (eg, urinary tract infection)<br>Be able to:<br>Elicit a history of increase in the frequency of stools<br>Determine the character of stools (eg, watery, bloody) |
| Physical | Be able to:<br>Assess the state of hydration |
| Diagnosis | Be able to:<br>Assess presence of leukocytes or red bloods cells on stool microscopy<br>Order appropriate investigations (eg, stool microscopy and cultures, assay for rotavirus, urine cultures) |
| Management | Be able to:<br>Initiate treatment for dehydration (ie, oral rehydration/ intravenous hydration) |

| **Shock** (see also ***Critical Care in Children***)<br>By the end of training, the resident should: | |
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| History | Know the major causes of shock:<br>Hypovolemic (dehydration, blood loss)<br>Septic (infection)<br>Cardiogenic (congenital/acquired heart disease) |

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| | Distributive (anaphylaxis, spinal cord injury)<br>Be able to:<br>Obtain a focused history to aid diagnosis |
| Physical | Be able to:<br>Recognize the clinical signs of shock due to fluid loss |
| Diagnosis | Be able to:<br>Assess blood pressure, heart rate, skin perfusion, and microcirculation<br>Initiate appropriate diagnostic studies (chest X-ray, ECG, Echocardiogram) |
| Management | Be able to:<br>Administer the proper type of fluids for the treatment of shock<br>Initiate frequent clinical assessment for the treatment of shock<br>Initiate immediate fluid resuscitation of infants in shock and realize it may require more than 20 mL/kg of fluid to improve their clinical conditions |

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| **Acute allergy and anaphylaxis** (see ***Allergy***) |

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| **Syncope** (see ***Cardiology***) |

| **Wounds**<br>By the end of training, the resident should: | |
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| General | |
| History | Understand the challenges with a laceration through the vermilion border of the lip<br>Understand the principles of wound cleansing<br>Know the sequelae of puncture wounds (eg, bites, penetrating nail injuries) |

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| Physical | Be able to:<br>Evaluate a patient with a swollen foot and a fever after a puncture wound into the foot<br>Recognize the clinical manifestations of puncture wounds (eg, bites, penetrating nail injuries) related to the time since the injury occurred |
| Diagnosis | |
| Management | Be able to:<br>Use immune globulins for tetanus prophylaxis appropriately<br>Manage puncture wounds (eg, bites, penetrating nail injuries) including the consideration of surgical drainage<br>Plan the management of lacerations while accounting for possible complications |
| Bites [Reptile, arachnida (mites, spiders, ticks)] (see also ***Allergy***) | |
| Snake, spider | |
| History | Know that poisonous snakes have triangular-shaped heads, a heat sensor (pit) in front of each eye, fangs, slit-like pupils, and a single row of subcaudal plates<br>Know the types of venomous reptiles and arachnida species in your region |
| Physical | Be able to:<br>Recognize the early clinical manifestations of snake bites (eg, intense local pain and burning, local edema, local ecchymosis, neurologic effects)<br>Recognize manifestations of venomous spider bites (eg, local reaction, cholinergic effects, ischemia/ skin necrosis) |
| Diagnosis | Be able to:<br>Formulate a diagnosis based upon history of bite |
| Management | Be able to<br>Plan the management of snake and spider bites<br>Work in collaboration with local/regional poison control experts |

| Bites [animal and human] (see also ***Allergy***) | |
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| Dog, cat, rodent, human | |
| History | Know the types of rabid species in your region<br>Know that dog bites may cause abrasions, puncture wounds, lacerations, and crush injuries<br>Know that cat and rat bites cause puncture wounds<br>Know that cat bites often penetrate deep into tissue<br>Be able to:<br>Recognize and differentiate human bites (eg, occlusion injury and clenched fist injury types) from other forms of bites |
| Physical | Be able to:<br>Determine type, size, and depth of injury from bite<br>Determine presence of foreign material in wound<br>Determine status of underlying structures, including range of motion where appropriate |
| Diagnosis | Be able to:<br>Formulate a diagnosis based upon history of bite and circumstances surrounding the bite |
| Management | Be able to:<br>Initiate the appropriate antibiotic therapy for dog or cat bites<br>Plan the management of animal and/or human bites |
| Insect sting (see also ***Allergy***) | |
| History | Know the types of insect species in region |
| Physical | Be able to:<br>Recognize life-threatening reactions to Hymenoptera stings (eg, hypotension, wheezing, laryngeal edema) |
| Diagnosis | Know that when developing a differential diagnosis for children <16 years of age, who experience either large local reactions or generalized urticaria to insect stings, they do not require skin testing or desensitization to Hymenoptera |

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| | (eg, wasps, bees, ants) |
| Management | Be able to:<br>Implement immunotherapy with insect venom as it is very effective in preventing subsequent reactions |
| Rabies (see also ***Infectious Diseases***) | |
| History | Know what kinds of bites do not require rabies prophylaxis |
| Physical | |
| Diagnosis | |
| Management | Be able to:<br>Recommend next steps in rabies management for a child that has been bitten by an animal suspected of carry the rabies virus<br>Recommend appropriate action for the animal that bites a child |

| **Trauma**<br>By the end of training, the resident should: | |
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| General (including abdominal and multisystem) | |
| History | Know which sports may predispose to abdominal trauma |
| Physical | Know about the rapid tools available for assessing levels of illness and injury in children (eg, Pediatric Assessment Triangle)<br>Know about the hands-on physical assessment of the ABCDE (Airway, Breathing, Circulation, Disability, Exposure)<br>Be able to:<br>Assess patients with isolated head injury, multisystem trauma, and abdominal trauma<br>Initiate assessment by visual and auditory impression (eg, appearance of mental status and muscle tone), work of breathing (ie, increased/decreased, labored), and circulation (eg, skin and mucous membrane color) followed by hands-on assessment of ABCDE |

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| Diagnosis | Be able to:<br>Order appropriate diagnostic tests to assess abdominal trauma |
| Management | Know that the goals are to assess, stabilize, and initiate definitive management<br>Know that priorities for management are:<br>To identify hemodynamic, neurologic, and anatomic abnormalities by performing a rapid physical examination and vital sign check<br>To treat any life-threatening disturbances, manage the airway, obtain vascular access and begin fluid resuscitation<br>Be able to:<br>Identify injuries that require surgical intervention (eg, spleen or bladder rupture)<br>Re-examine patient for non-life threatening injuries and initiate treatment<br>Consult with relevant specialists |
| Head (see also ***Sports Medicine***) | |
| History | Know the immediate life-threatening complications of closed-head trauma<br>Understand that papilledema may not be present initially and may develop later in the course of intracranial hypertension<br>Understand the association of drug and alcohol use/abuse with head injury |
| Physical | Know that the Glasgow Coma Scale (GCS) is the gold standard for neurologic assessment following trauma<br>Know the components of the GCS (Eyes, Motor, Verbal) and the predictive value of the GCS<br>Understand the significance of ecchymoses in the orbital area<br>Be able to:<br>Recognize severe brain injury/trauma in a patient who has no external signs of trauma<br>Recognize the signs of a progressive increase in intracranial pressure |

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| | Recognize the signs and symptoms of closed head trauma<br>Assess the neurologic and physical status of a patient with a head injury |
| Diagnosis | Understand the usefulness and limitations of computed tomography (CT scan) in a patient with a closed-head injury and brief loss of consciousness<br>Be able to:<br>Identify temporal bone fractures by common manifestations (eg, bleeding from the external auditory canal or hemotympanum, hearing loss, facial paralysis, and cerebrospinal fluid otorrhea)<br>Identify and plan appropriate follow-up for blood behind the tympanic membrane<br>Correctly identify false-positives and false-negatives for significant intracranial injury using x-ray<br>Diagnose a basilar skull fracture in the presence of the Battle sign (postauricular bruise)<br>Perform a retinal examination in a patient with seizures or in a coma |
| Management | Be able to:<br>Plan the outpatient management of minor head trauma<br>Plan the initial management of a patient with acute CNS trauma<br>Consult with specialists for more severe injuries |
| Burns (see also ***Critical Care in Children***) | |
| History | Know the problems associated with different forms of burns (eg, electrical, contact) |
| Physical | Be able to:<br>Exam the sites of burn to evaluate for level of seriousness |
| Diagnosis | Be able to:<br>Distinguish between first-degree burns and more serious burns |
| Management | Be familiar with the principles of acute care of patients (eg, maintain airway, breathing, circulation)<br>Be able to: |

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| | Give first aid measures (eg, remove dead tissue, wash wound)<br>Advise parents about management of long term complications, reconstruction, and rehabilitation<br>Manage electrical burns<br>Provide fluid resuscitation<br>Monitor and recommend energy requirements<br>Control pain with appropriate pain management therapies<br>Ensure prevention of infection (eg, early excision and grafting)<br>Ensure prevention of excessive metabolic expenditures<br>Control bacterial wound flora<br>Use biologic and synthetic dressings to close the wound<br>Consult with specialists for more severe injuries |
| Fractures, dislocations (see ***Musculoskeletal Disorders***) | |
| Neurovascular states | |
| History | Know the bone and joint injuries that commonly affect vasculature (eg, supracondylar fracture of humerus)<br>Know the importance of open and closed fractures |
| Physical | Be able to:<br>Assess for any neuro-vascualr complications of fractures |
| Diagnosis | |
| Management | Be able to:<br>Plan the management based on type of fracture (ie, open or closed) |
| Specific problems (eg, spiral fracture, “nursemaid’s” elbow) | |
| History | Be able to:<br>Elicit an adequate history of the situation the fracture took place |

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| Physical | Be able to:<br>Recognize the typical patient with subluxation of the radial head (nursemaid's elbow)<br>Recognize open and closed fractures |
| Diagnosis | Be able to:<br>Identify a greenstick fracture<br>Recognize fracture of the clavicle and plan treatment<br>Recognize acromioclavicular separation in an athlete |
| Management | Be able to:<br>Plan the treatment for subluxation of the radial head (nursemaid's elbow)<br>Evaluate and stabilize a patient with a possible spinal cord injury |

| **Seizures** (see ***Neurology***) |
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| **Poisonings/toxic exposures** (see also ***Toxicology and Poisoning Emergencies***) |
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| **Natural disasters** | |
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| Management | Understand the need for triage in times of natural disaster<br>Be able to:<br>Coordinate the set up of a rescue operation team<br>Address safety and hygiene concerns during natural disasters |

## *Fluid, Electrolyte and Acid-Based Disorders of an Emergent Nature*

| **General**<br>By the end of training, residents should: | |
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| History | Know the physiologic requirements for major electrolytes(ie, sodium, potassium and chloride)<br>Understand how the equilibrium of water is maintained between body compartments<br>Know the acid base and electrolyte abnormalities that may be seen with diuretic use<br>Know the relationships between serum electrolytes and total body content of those electrolytes |
| Physical | Be able to:<br>Identify and interpret the vital signs used to assess hydration status |
| Diagnosis | Be able to:<br>Identify critical disturbances (eg, hyper/hyponatremia hyper/hypokalemia)<br>Calculate plasma osmolality when it is diagnostically important to estimate plasma osmolality<br>Calculate and interpret fractional sodium excretion |
| Management | Be able to:<br>Manage isotonic, hypo-, and hyper-natremic dehydration<br>Initiate management of acid-base and electrolyte disorders<br>Effectively collaborate with the health care team, family, and specialists regarding concerns about fluid and electrolyte issues |

| **Composition of body fluids**<br>By the end of training, residents should: | |
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| Fluid compartments | |
| Diagnosis | Know that equilibrium between extracellular fluid and intracellular fluid is maintained by the movement of water in response to alteration of osmolality of either compartment<br>Know the clinical relevance of estimating plasma osmolality from serum electrolytes, blood urea nitrogen, and blood glucose concentrations |

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| | Know that chronic sodium depletion may result in intravascular volume depletion |
| Electrolyte composition | |
| Diagnosis | Know that serum sodium concentration does not reflect total body sodium content<br>Know that serum potassium concentration does not reflect total body potassium content |
| Management | Know the physiologic requirements for sodium, potassium, and chloride |

| **Acid-base physiology (ie, normal mechanisms, acidosic, alkalosis)**<br>By the end of training, a resident should: | |
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| Normal mechanisms and regulation | |
| Diagnosis | Understand the pulmonary and renal mechanism for regulating acid-base physiology<br>Be able to:<br>Calculate the anion gap |
| Acidosis, alkalosis | |
| History | Know the consequences of gastric and intestinal fluid loss for acid base status<br>Know common medications that may cause acidosis and alkalosis |
| Physical | Be able to:<br>Recognize the clinical signs of metabolic acidosis/alkalosis |
| Diagnosis | Be able to:<br>Interpret the serum findings in acidosis and alkalosis<br>Differentiate between pulmonary and metabolic causes and their compensatory changes<br>Calculate the anion gap and interpret its significance<br>Formulate a differential diagnosis for acidosis and alkalosis in relation to altered anion gap |
| Management | Be able to:<br>Plan the initial treatment for metabolic acidosis and alkalosis |

| **Electrolyte abnormalities** (see also ***Endocrinology***) | |
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| Sodium (Hyper- and Hyponatremia) | |
| History | Know features in the history which would risk the development of hypo- or hypernatremia<br>Know medications that may risk the development of hyponatremia<br>Know the symptoms of hypo- and hypernatremia<br>Know the risks of developing intracranial hemorrhage with hypernatremic dehydration |
| Physical | Be able to:<br>Assess hydration status |
| Diagnosis | Know the importance of urinary sodium concentration and urinary osmolality in the differential diagnosis of hyponatremia<br>Be able to:<br>Distinguish between dilutional hyponatremia and a total body deficit of sodium<br>Calculate the value and interpretation of fractional sodium excretion<br>Identify conditions that may present with hyponatremia and increased sodium excretion in the urine<br>Differentiate diabetes insipidus from hypernatremic dehydration |
| Management | Be able to:<br>Manage hypo- and hypernatremia and know the importance of slow replacement<br>Manage seizures in an infant with chronic hypernatremia who is being rapidly rehydrated<br>Know when to consult with a specialist |
| Potassium (Hyper- and Hypokalemia) | |
| History | Know the features in the history which would predispose a patient to developing hypo- or hypekalemia |
| Physical | Be able to: |

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| | Know electrocardiographic changes seen in hypo- and hyperkalemia<br>Identify the signs of hypo- and hyperkalemia |
| Diagnosis | Know that obtaining a repeat serum potassium measurement may be indicated when an initial serum potassium measurement is elevated<br>Be able to:<br>Order appropriate laboratory evaluation (eg, creatinine and assessment of the acid-base status) |
| Management | Be able to:<br>Manage hypo and hyperkalemia<br>Initiate the immediate emergency treatment of hyperkalemia<br>Consult with a specialist when appropriate |
| Magnesium (hyper- and hypomagnesemia) | |
| History | Understand the etiology and pathophysiology of hyper- and hypomagnesemia |
| Physical | Be able to:<br>Recognize the signs and symptoms and associated complications (eg, secondary hypocalcemia)<br>Identify hypotonia, hyporeflexia, and weakness in cases of hypermagnesemia |
| Diagnosis | Be able to:<br>Recognize the signs of hypocalcemia in making the diagnosis of hypomagnesemia<br>Diagnose hypomagnesemia and its associated disorders (eg, gastrointestinal disease, and know that some rare genetic diseases are associated with low magnesium) |
| Management | Be able to:<br>Initiate parenteral magnesium to treat hypomagnesemia<br>Understand the role of hydration, loop diuretics, and dialysis in the treatment of mild to severe hypermagnesemia |

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| | Consult with a specialist when appropriate |
| Phosphate (hyper- and hypo Hypophosphatemia) | |
| History | Understand the etiology and pathophysiology of phosphatemias<br>Be aware of associated clinical conditions that may affect phosphate metabolism and regulation (eg, tumors, hyperparathyroidism, renal failure)<br>Be able to:<br>Investigate nutrition, medication, and family history |
| Physical | Be able to:<br>Recognize features of tetany as they may be indicative of hypocalcemia in severe hyperphosphatemia |
| Diagnosis | Be able to:<br>Identify appropriate laboratory levels of phosphate in children versus adults |
| Management | Be able to:<br>Initiate phosphate supplementation as well as phosphate lowering phosphate binder<br>Consult with a specialist when appropriate |
| Calcium (see ***Endocrinology***) | |

| **Fluid and electrolyte therapy of specific disorders**<br>By the end of training, a resident should: | |
|---|---|
| Acute diarrhea and oral rehydration | |
| History | Know that intracranial hemorrhage may occur during the development of hypernatremic dehydration |
| Physical | Know the signs and symptoms of dehydration and that they are related to changes in extracellular fluid volume<br>Know that seizures can occur in an infant with chronic hypernatremia who is being rapidly rehydrated<br>Be able to:<br>Identify hypotension and realize it is a very late sign of dehydration |

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| Diagnosis | Be able to:<br>Interpret the clinical and laboratory abnormalities of hypo- and hypernatremic dehydration<br>Interpret the laboratory abnormalities of isotonic dehydration<br>Differentiate diabetes insipidus from hypernatremic dehydration (ie, urine specific gravity, urine and serum osmolalities)<br>Measure electrolytes, acid base status, glucose and kidney function |
| Management | Understand the differences between and rationale for the composition of oral rehydration solutions<br>Be able to:<br>Plan the management of hyper- and hyponatremic dehydration<br>Plan the management of isotonic dehydration<br>Utilize oral rehydration solutions for treating acute diarrheal dehydration<br>Consult with a specialist when appropriate |
| Diarrhea in chronically malnourished children (see also ***Nutrition***) | |
| History | Be able to:<br>Obtain a detailed feeding history |
| Physical | Be able to:<br>Assess nutritional status and volume status if possible |
| Diagnosis | Be able to:<br>Evaluate growth charts<br>Interpret electrolyte levels |
| Management | Be able to:<br>Develop plan to improve nutritional statu<br>Consult with a specialist when appropriate |

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| Pyloric stenosis | |
| History | Know the pattern of vomiting and typical age of presentation |
| Physical | Be able to:<br>Assess hydration status and weight development |
| Diagnosis | Be familiar with appropriate diagnostic imaging tests to order to aide in the diagnosis |
| Management | Be able to:<br>Consult with a specialist when appropriate |
| Acute renal failure (see ***Nephrology***) | |
| Shock (see ***Emergency Medical Care***) | |
| Hyper-osmolar non-ketotic coma | |
| History | Know history of diabetes mellitus preceding hyperosmolar coma |
| Physical | Be able to:<br>Assess volume status |
| Diagnosis | Be able to:<br>Measure electrolytes, glucose, appropriate kidney functions, and serum osmolality |
| Management | Be able to:<br>Plan appropriate fluid therapy for a patient with hyperosmolar non-ketotic coma to prevent the development of cerebral edema<br>Consult with a specialist when appropriate |
| Drug-induced electrolyte abnormalities | |
| History | Know drugs causing electrolyte loss, mainly diuretics, in rare cases lithium |
| Physical | Be able to:<br>Assess volume status |

## *Fluid, Electrolyte and Acid-Based Disorders of an Emergent Nature*

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| Diagnosis | Be able to:<br>Order and interpret tests of electrolytes, kidney function, and acid base status |
| Management | Be able to:<br>Determine need of diuretic therapy and replace deficits in a timely fashi<br>Consult with a specialist when appropriate |

# *Toxicology and Poisoning Emergencies*

| **General**<br>By the end of training, the resident should: | |
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| History | Understand that the majority of unintentional poisonings occur in young children (ie, less than 6 years old)<br>Know the locations where poisonings are most likely to take place<br>Know the most common substances, and routes, seen in poisonings in children in your area<br>Know the importance of time of ingestions<br>Understand that poisoning may be a sign of child abuse<br>Be able to:<br>Use as many resources as available to obtain an ingestion history |
| Physical | Be able to:<br>Identify signs associated with all common ingestions |
| Diagnosis | Know the importance of eliminated body fluids in identifying an unknown toxin<br>Know that clothing can help detect unknown toxin |
| Management | Understand how to counsel families to prevent poisonings<br>Know to begin counseling families regarding ingestion prevention before child is mobile<br>Be able to:<br>Access poison control center if available<br>Identify on line resources to assist with poisoning management<br>Remove residual toxin wherever possible<br>Provide long term follow up as appropriate |

| **Specific acute poisonings, ingestions, and exposures**<br>By the end of training, the resident should: |
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## *Toxicology and Poisoning Emergencies*

| Medications, organic compounds, toxic plants | |
|---|---|
| History | Be aware of potentially harmful additives in over-the-counter medications (eg, ethanol in mouthwash, salicylate in antidiarrheal products)<br>Understand that more than one potentially toxic substance may be ingested |
| Physical | Understand the various signs associated with different types of poisonings and toxic exposures/ingestions<br>Be able to:<br>Identify the signs associated with the suspected ingestion (eg, anticholinergic, narcotic, sympathomimetic symptoms) |
| Diagnosis | Be able to:<br>Identify from the history and signs of toxicity the drug(s) likely to have been ingested<br>Measure drug levels and other biochemical parameters that may be relevant |
| Management | Be able to:<br>Manage a suspected or confirmed overdose/ingestion/exposure with specialist consultation when necessary<br>Manage a child who has ingested a substance containing a hydrocarbon<br>Identify which ingestions require long-term evaluation |
| Caustic Ingestions | |
| History | Know the common household sources of acids and alkali (eg, vinegar, caustic soda, detergents)<br>Know that corrosive material such as hydrochloric and sulfuric acids can be transported to the stomach with few or no esophageal burns, causing severe gastritis, perforation, or late stricture formation |
| Physical | Be able to:<br>Identify possible signs associated with ingestion of these compounds (eg, mucosal burns, drooling) |
| Diagnosis | Know that gastric lavage is contraindicated in a caustic ingestion<br>Know the role of endoscopy after a corrosive ingestion |

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| Management | Be able to:<br>Manage a child with ingestions of acid, alkali or alkaloids |
| Foreign objects (eg, button batteries, coins) | |
| History | Be able to:<br>Determine from the history if the nature of the objects ingested (eg mercury, alkaline or silver cell batteries) |
| Physical | Be able to:<br>Identify signs associated with complication of a foreign body ingestion (eg, aspiration, perforation) |
| Diagnosis | Understand the importance and limitations of imaging patients with suspected foreign body ingestion |
| Management | Be able to:<br>Manage children who have ingested toxic substances (eg, button battery, coins)<br>Initiate referral to specialist if necessary |
| Petrolleum distillates (eg kerosene, turpentine, white spirit, turpentine substitute | |
| History | Know that white spirit and turpentine are some of the commonest household products to be ingested<br>Know that in countries where kerosene(paraffin) is used as a cooking fuel, toxic ingestion is particularly common<br>Know that ingestion may cause pneumonitis due to lung aspiration |
| Physical | Be able to:<br>Identify physical findings suggestive of respiratory involvement |
| Diagnosis | Be able to:<br>Recognize the chest x-ray changes associated with interstitial pneumonitis |
| Management | Know that lavage is contraindicated<br>Be able to:<br>Manage respiratory complications |
| Inhalations (eg, Carbon Monoxide, Hydrogen Cyanide) | |

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| History | Know the symptoms associated with inhalation may be evolve very slowly or quickly depending upon the gas inhaled and the duration of inhalation<br>Be aware of the common symptoms associated with inhalation toxicity<br>Know that symptoms are more severe when larger doses are inhaled |
| Physical | Understand that the physical findings can be variable based upon extent of inhalation toxicity<br>Be able to:<br>Identify the signs associated with common inhalation toxicities |
| Diagnosis | Be familiar with the laboratory studies needed to diagnose commonly inhaled substances |
| Management | Understand the need to administer oxygen to these patients promptly<br>Understand the need to monitor and support the organ systems effected by the inhalation toxicity<br>Be able to:<br>Provide respiratory supportive care as required |

| **Exposure to toxic substances in the environment**<br>By the end of training, the resident should: | |
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| History | Understand why infants are at greater risk than adults from toxic substances in the environment<br>Know the type of contaminants potentially found in drinking water (eg, E. coli, Cryptosporidium, trichloroethylene, perchloroethylene)<br>Know the type of toxic substances that may contaminate food sources (eg, mercury, E. coli)<br>Know the toxic substances that may contaminate the environment and affect the health of children (eg, pesticides, industrial waste)<br>Know the common exposures and health problems that are associated with house renovation and repair<br>Know the potential occupational exposures that directly or indirectly affect the health of children<br>Know about toxic exposures from terrorism |

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| | Be able to:<br>Obtain a history of exposure to toxic substances in the environment taking into consideration toxic substances in water, food, home, and local community |
| Physical | Be able to:<br>Identify any signs associated with chronic environmental exposure to toxins |
| Diagnosis | Be able to:<br>Consider exposure to toxic substances in the environment as a cause for symptoms<br>Recognize the characteristic skin lesions of anthrax<br>Differentiate the skin lesions of varicella from those of smallpox |
| Management | Know about the role of public health professionals in dealing with control of exposure to environmental toxins<br>Be able to:<br>Consult with appropriate authorities regarding concerns about environmental toxins |
| Lead poisoning | |
| History | Know the various sources of lead containing compounds<br>Understand different routes of lead acquisition with ingestions being most common (eg, ingestion, inhalation, cutaneous)<br>Know that lead poisoning may occur *in utero* |
| Physical | Understand that clinical signs do not necessarily correlate with the degree of toxicity<br>Be able to:<br>Recognize the signs associated with lead toxicity |
| Diagnosis | Know that blood lead level is the most useful diagnostic test to evaluate lead exposure/toxicity |
| Management | Understand the importance of removing the patient from the source of lead<br>Be able to: |

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| | Manage the initial treatment of lead toxicity<br>Make appropriate referrals for additional treatment of lead toxicity |

## *Palliative Care*

| **General definitions**<br>At the end of training a resident should: | |
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| | Know the definitions of palliative care approach; general palliative care; specialist palliative care; hospice; palliative medicine; supportive care<br><br>Understand the broad definition of palliative care in childhood<br><br>Understand the changing role of palliative care over time, including extension to diseases other than cancer |

| **General signs and symptoms**<br>At the end of training a resident should: | |
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| History | Take a relevant focused history, identifying those symptoms and signs that suggest end of life care is appropriate<br><br>Have a basic understanding of the needs of the dying child and their family including cultural and religious issues<br><br>Understand the importance of exploring an individual family's priorities and of negotiating achievable goals<br><br>Know the range of attitudes to life and death, food restrictions, festivals, and modesty rules for the main religious faiths in your country<br><br>Understand quality of life issues from the child's perspective<br><br>Understand the varied coping mechanisms used by patients, families, and healthcare providers, including guilt, anger, and sadness<br><br>Understand the needs for relatives of a sick and dying child (ie, siblings, parents, grandparents) to talk about their experiences<br><br>Understand that children know they are seriously ill whether they are told or not<br><br>Understand children may feel abandoned and unloved when the adults around them do not offer to be open and to answer questions about their illness progression and prognosis<br><br>Understand the impact of collusion between parents and professionals to deny a child's impending death<br><br>Understand social and clinical concepts of suffering; its complexities and different articulations within different sectors of society |

## *Palliative Care*

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| | Know about the presentation, paths of spread, and current management of major malignancies<br><br>Know the presentation, usual course, and current management of other life limiting, progressive illnesses including severe brain injuries, complications of prematurity, developmental defects, neurodegenerative conditions, cystic fibrosis, chronic cardiac and renal disease<br><br>Know about the common para-neoplastic syndromes<br><br>Be able to:<br><br>Conduct a focused history identifying the range of symptoms encountered in palliative care including: anorexia, cachexia, pruritis, hiccough, seizures , spasm, pain, dyspnea<br><br>Identify the range of psychological symptoms encountered when a child is entering a terminal phase of life<br><br>Identify symptoms associated with likely emergencies encountered early in the palliative care including cord compression, hemorrhage, SVC obstruction, uncontrolled pain, and seizures<br><br>Distinguish normal loss and grief reactions from dysfunctional reactions |
| Physical | Be able to:<br><br>Perform a focused clinical examination and interpret the signs despite a patient's cognitive or physical limitations<br><br>Identify when a child is entering the terminal phase of an illness<br><br>Accurately assess hydration and nutritional status<br><br>Identify signs of clinical emergencies such as cord compression, SVC obstruction, and raised intracranial pressure<br><br>Identify a range of clinical signs commonly encountered in end-of-life care and their implications |
| Diagnosis | Be able to:<br><br>Identify factors which determine when care of a patient becomes palliative<br><br>Select and interpret appropriate investigations<br><br>Identify features in the clinical presentation or investigation which suggest serious pathology |

## *Palliative Care*

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| | Differentiate between treatment and disease related signs and symptoms |
| Management | Know how the goals and application of treatments differ in palliative care from disease- directed care<br>Understand the need to respect the wishes of a child or young person particularly when they differ from those of family and health professionals<br>Understand the impact of anxieties about death, hidden or overt, among professionals, patients, and families<br>Understand common family responses to impending death of a child<br>Understand the need for support when dealing with the pain of loss associated with the deterioration and death of patients and have appropriate personal and professional support mechanisms in place<br>Understand role of genetic counseling when certain life-limiting conditions are discovered in a family<br>Understand the evolving nature of palliative care over the course of an illness, including integration with active treatment, and the significance of transition points<br>Know about re-adaptation and rehabilitation<br>Know about differing culturally, individual, and socio-economically driven concepts of what constitutes quality of life and a “good death”<br>Understand the principles of transition of care for teenagers and young adults between pediatric and adult palliative care services<br>Be able to:<br>Apply a family-centered approach<br>Provide seamless, coordinated care in the face of a chronic or complex condition<br>Counsel families appropriately regarding treatments used<br>Consult with specialists appropriately regarding treatment<br>Manage situations of clinical uncertainty, especially with respect to prognosis and likelihood of death<br>Maintain awareness of personal values and belief systems and how these influence professional judgments and behaviors in provision of palliative care |

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| | Utilize a wide variety of care delivery models to a child whose death is imminent, including home, hospital, and/or hospice care<br>Explore family wishes regarding resuscitation of child<br>Assist the family to recognize when disease-directed interventions may be causing more harm than benefit<br>Provide appropriate professional support to families after death of a child<br>Manage patients in context of evolving nature of palliative care over the course of illness including integration with active treatment and significance of transition points<br>Enable patients to maximize function using principles of re-adaptation and rehabilitation<br>Discuss societal expectations and perceptions in progressive and advanced disease and death |
| **Symptom control**<br>By the end of training a resident should: | |
| History | Be able to:<br>Identify the full range of symptoms a patient may be experiencing |
| Physical | Be able to:<br>Identify physical signs linked to those symptoms |
| Diagnosis | Be able to:<br>Differentiate those symptoms for which there are disease directed interventions and those for which only symptom control is available |
| Management | Know how to prevent and manage symptom distress using the whole armamentarium of pharmacologic, non-pharmacologic, surgical, psychological, traditional, radiation, interventional pain management, and other techniques as available in your setting<br>Know the long term effects of opioids and its related neurotoxicity<br>Know the indications for opioid switching<br>Know about non-drug treatment of pain (eg, transcutaneous electrical nerve stimulation (TENS), acupuncture, |

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| | physiotherapy, immobilization)<br>Know about common nerve blocks and other neurosurgical procedures<br>Know about psychological interventions in pain management<br>Be able to:<br>Provide proper drug treatment of pain (WHO analgesic ladder and appropriate use of adjuvant drugs ;see http://www.who.int/cancer/palliative/painladder/en/)<br>Use opioid analgesics safely for the management of symptom distress<br>Identify and treat neuropathic pain with anticonvulsants, antidepressants, steroids, topical agents, anti-virals; and review and revise current medicines as appropriate<br>Design and implement an effective pain management plan, including the frequency with which it should be monitored and re-evaluated based on the pharmacodynamics, pharmacogenetics, and delivery route of a given medication regimen<br>Manage common gastrointestinal symptoms including mucositis, nausea and vomiting, swallowing difficulty, ascites, constipation, and diarrhea<br>Manage cachexia, anorexia, stomas, and gastrostomy tubes<br>Initiate management of respiratory symptoms including cough, breathlessness, hiccoughs, airway obstruction, haemoptysis, pleural and pericardial effusion, and SVC obstruction<br>Manage non- invasive respiratory support where available and when appropriate<br>Manage common urinary symptoms including renal failure, urinary retention, and bladder spasm<br>Manage common dermatological symptoms including pruritis and pressure sores<br>Manage common electrolyte disturbances including hypo/hypernatremia, hypo/ hypercalcemia and hypo/hyperkalemia |
| **Multi-disciplinary team working**<br>At the end of training a resident should: | |
| History | Be able to: |

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| | Conduct a thorough history identifying all the agencies and professionals who are involved in the care of the child<br>Identify the child and families perceptions of the roles each of these agencies and professionals play in the care of the child |
| Physical | |
| Diagnosis | |
| Management | Understand importance of involving multi-disciplinary team in assessment and management of children with life-limiting conditions<br>Understand local opportunities for respite care including hospice availability<br>Be familiar with specific organizational structures commonly needed in the holistic support of children with life-limiting conditions<br>Understand importance of establishing close links with relevant support services including child and adolescent psychiatric services, counseling, and support groups<br>Understand importance of non-medical professional's role in providing holistic care, especially nurses, social workers, psychologists, and religious leaders<br>Understand the need to minimize hospital admission in order to maximize the patient's and family's quality of life<br>Understand the value of music, art, and play therapy to minimize the suffering of children and their families<br>Understand the potential for conflict between professionals involved in the care of a child<br>Understand the vulnerability of colleagues in caring for a child with a life limiting condition<br>Know how to obtain advice from specialists about end-of-life issues<br>Be able to:<br>Identify skills and experience of other professionals and incorporate these into the care planning process<br>Work with multidisciplinary teams in managing symptoms<br>Effectively and compassionately navigate communication challenges between professionals and families |

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| | regarding decision-making in the face of a terminal condition<br>Provides access to bereavement support services<br>Acknowledge personal and team needs for support in the care of the dying child<br>Facilitate appropriate support for colleagues experiencing difficulty in dealing with a dying child |
| **Ethical and legal issues**<br>At the end of training a resident should: | |
| History | Be able to:<br>Identify aspects of the history that may present ethical or legal dilemmas in the management |
| Physical | Be able to:<br>Conduct a consultation in a sensitive and confidential manner |
| Diagnosis | |
| Management | Understand the processes of ethical reasoning and decision-making in the care of chronically and terminally ill children<br>Be familiar with local and national guidelines on withdrawing and withholding medical interventions<br>Know the legal and ethical issues related to medical decision making and withdrawing life support<br>Know the importance of seeking advice when disease directed medical interventions may no longer be in the best interests of a child<br>Understand the philosophical, political, psychological, and ethical issues in therapeutic intervention in children with life-limiting conditions<br>Be familiar with ethical and legal debates surrounding euthanasia and physician-assisted suicide<br>Be aware of global differences in legislation on euthanasia and physician-assisted suicide<br>Know how to provide death certification and care of the body after death<br>Know the legal requirements and procedures for requesting post-mortem autopsies and biopsies as well as issues around retention of tissue after death |

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| | Know how to accommodate religious and cultural values for the autopsy process while still obtaining the information necessary for quality practice<br><br>Understand the value of post-mortem findings for answering questions and facilitating family planning and the bereavement process for affected families<br><br>Be able to:<br><br>Advise families on the potential bereavement impact and practicalities relating to organ donation |

## *Perioperative Care*

| **Preoperative care**<br>By the end of training, the resident should: | |
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| History | Know that certain chronic medical conditions (eg, asthma, obstructive sleep apnea, pulmonary hypertension, obesity) may have significant effects on a child's anesthetic course<br><br>Understand that a child's pre-anesthetic metabolic state and volume status may have significant effects on their tolerance and reaction to anesthesia and surgery<br><br>Know that recent viral upper respiratory infections, particularly with Respiratory Syncytial Virus, may place the child at risk for pulmonary complications during anesthesia and post-operative respiratory failure<br><br>Understand risk stratification systems commonly used by anesthesiologists (eg, ASA classification)<br><br>Understand that a family history of malignant hyperthermia may place a child at higher risk but that negative family history does not preclude the diagnosis<br><br>Be able to:<br><br>Obtain a history of prior anesthetic or sedation events<br><br>Obtain a history of snoring, noisy breathing, or other symptoms that may suggest upper airway obstruction |
| Physical | Be familiar with commonly used classification systems (eg, Malampati) to predict difficulty of intubation<br><br>Be able to:<br><br>Evaluate a child's upper airway by physical examination<br><br>Identify craniofacial anomalies that may impact management of the child's airway<br><br>Perform a careful pulmonary examination |
| Diagnosis | Understand that routine pre-operative x-rays and laboratory work in a healthy child before elective surgery are generally unnecessary |
| Management | Have knowledge regarding various anesthetic pre-medications<br><br>Be able to: |

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| | Participate in the preoperative evaluation in cooperation with the surgeon and anesthetist<br>Guide patient and family with fasting guidelines<br>Help prepare a child psychologically for surgery<br>Appropriately prescribe antibiotics for prophylaxis of bacterial endocarditis as indicated by local guidelines<br>Effectively communicate potential problems with airway or anesthetic management to the anesthetist<br>Optimize management of pre-existing medical conditions, such as asthma, prior to surgery<br>Rapidly correct fluid and electrolyte abnormalities prior to surgery |

| **Postoperative care**<br>By the end of training, the resident should: | |
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| History | Understand the risk factors and age-related incidence of post-operative thromboembolic phenomena<br>Be able to:<br>Interpret the operative and anesthesia record in order to predict problems in the post-operative period |
| Physical | Be able to:<br>Assess respiratory, cardiovascular, and neurologic status in postoperative patient<br>Assess volume status |
| Diagnosis | Be able to:<br>Recognize post-operative respiratory failure<br>Assess pain in children of all age groups<br>Utilize appropriate laboratory studies to diagnose common electrolyte abnormalities in the post-operative period<br>Identify postoperative complications (eg, obstructive apnea and pulmonary oedema after tonsillectomy) |
| Management | Know the detrimental effects of hypothermia on the neonates and infants and initiate proper preventive and |

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| | corrective measures<br>Understand the various pharmacologic and non-pharmacologic therapies of pain management post-surgery<br>Be able to:<br>Effectively treat post-operative pain<br>Initiate and manage hemodynamic support as indicated by the patient status including fluid resuscitation and vasoactive medications<br>Initiate and manage respiratory support as indicated by the patient status including oxygen therapy, non-invasive ventilation, and mechanical ventilation<br>Recognize and manage postoperative complications in neural tube defects and/or neuromuscular disorders<br>Maintain euglycemia and prevent development of acidosis in a child with diabetes<br>Monitor for and correct post-operative electrolyte abnormalities<br>Utilize preventive therapies for deep vein thrombosis as necessary<br>Effectively communicate with caretakers while child is in operating room and ICU |
| Peri- and post-operative fluid therapy | |
| History | Be able to:<br>Interpret intraoperative volume losses and volume administration |
| Physical | Be able to:<br>Assess volume status |
| Diagnosis | Be able to:<br>Measure electrolytes and acid base status |
| Management | Be able to:<br>Prescribe normal expenditure plus ongoing losses and eventually replace deficit with appropriate solutions through appropriate routes (oral or IV) |

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| | Manage fluid therapy taking into consideration maintenance requirements, ongoing losses, and deficit |

## *Rehabilitation*

| **General**<br>By the end of training the resident should: | |
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| History | Understand the epidemiology, pathophysiology, and natural history of a range of disabling conditions seen in childhood<br>Be able to:<br>Assess and record the common psychological disorders, psychosocial and behavioural consequences commonly seen in disabling disorders<br>Identify clinical problems that require physical medicine and rehabilitation for improvement and recovery<br>Identify in what way physical and psychological symptoms are impacting a child's functioning<br>Identify contextual factors that influence activity and participation |
| Physical | Understand the importance of consent and the right to privacy and dignity when conducting a physical examination<br>Be able to:<br>Examine the patient comprehensively and exercise good judgement in the selection of examination techniques<br>Assess functional limitations accurately (eg, level of mobility, cognitive functioning) |
| Diagnosis | Be able to:<br>Make an accurate diagnosis of the range of disabilities based on history and physical examination |
| Management | Be aware of the WHO definition of rehabilitation: The use of all means aimed at reducing the impact of disabling and handicapping conditions and at enabling disabled people to achieve optimal social integration.<br>Understand that the focus of care is to reduce the impact of disease or disability on daily life, to prevent avoidable complications, and to minimize the effects of changing disability<br>Understand that the ability to participate depends not only on activities or personal functioning but also on a corresponding number of contextual factors affecting personal life and the individual's environment<br>Understand that most aspects of rehabilitation medicine require a multidisciplinary team and may include other |

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| | specialists (eg, neurology, neurosurgery, orthopedic, palliative care, rheumatology)<br><br>Understand the role of Child Psychiatry and Psychology, particularly behavioral therapy, in the recognition of depression and severe illness behavior<br><br>Understand that social services and other non-medical agencies are often involved in the rehabilitation process to ensure that suitable care continues outside the hospital<br><br>Understand the concepts of reintegration into the community, specifically schooling<br><br>Be aware of disability legislation, accountability frameworks, professional standards for rehabilitation services, rights and expectations of people with disabling disorders and their representatives, both in the statutory and voluntary sectors in your country<br><br>Understand the management approaches for specific impairments (eg, spasticity, ataxia, , sensory impairment, neuropsychological dysfunction, bladder and bowel dysfunction)<br><br>Be able to:<br><br>Emphasize the role of multidisciplinary effort in rehabilitation medicine<br><br>Work with rehabilitation teams in different settings as well as within and across health, social, and community based organizations<br><br>Outline aims of physical medicine and rehabilitation to families and others involved with the care of the child<br><br>Coordinate the care of individuals with disabling conditions in a wide range of settings from the acute hospital environment to the individual's home in the community<br><br>Undertake the management of those children with severe medical or behavioural needs who may require a residential setting<br><br>Organize the discharge of children with severe on-going multiple and complex needs requiring multi-agency collaboration (eg, long-term ventilation, severe challenging behaviour)<br><br>Act as an advocate for people with disability, promoting their health and well being in the context of social and cultural factors which influence disability and their impact on the rehabilitation process<br><br>Provide accurate advice to patients and colleagues about rights and responsibilities with regard to a person |

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| | with a disability and their care takers |

| **Neurologic disabilities**<br>By the end of training the resident should: | |
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| **Acute spinal and head injuries (**see also ***Neurology*** and ***Emergency Medical Care*****)** | |
| History | Be able to:<br>Obtain a history to evaluate the pre-morbid level of functioning as well as current capabilities |
| Physical | Be able to:<br>Identify and record accurately persisting neurologic signs resulting from injuries |
| Diagnosis | Be able to:<br>Select relevant investigations to diagnose effects of injury and to guide prognosis |
| Management | Be able to:<br>Undertake early management of children/young people with significant acquired defects to promote recovery<br>Prevent complications such as ulcers, bed sores, and secondary infections arising from prolonged immobility<br>Undertake long-term follow-up and anticipate latent effects of injury (particularly with cognition, emotion, and behaviour) that often present in educational ways |
| **Chronic neurological problems (eg cerebral palsy, spina bifida) (**see also ***Neurology***) | |
| History | Be able to:<br>Obtain an accurate history of the child's current capabilities |
| Physical | Be able to:<br>Comprehensively evaluate a child with cerebral palsy including evaluation of hearing, sight, and learning and intellectual abilities<br>Identify the development of contractures and other disabling postures |

## *Rehabilitation*

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| Diagnosis | Understand importance of early diagnosis for maximal rehabilitation in a child with cerebral palsy<br>Know that it is possible to make a reasonably accurate prediction of a child with a neural tube defects future mobility even in the neonatal period |
| Management | Understand the aims of physical therapy in cerebral palsy<br>Be able to:<br>Manage motor and non-motor complications of neural tube defects<br>Advise on proper positioning and exercise programs in children with both cerebral palsy and/or spina bifida<br>Advise on orthoses including light weight splints, orthopedic shoes, and calipers<br>Prescribe drugs for reducing severe persistent spasticity and refer to surgeon if needed |
| **Sleep related disorders (eg muscular dystrophy, spinal muscular atrophy, congenital myopathies, cervical cord injury, congential central hypoventilation syndrome)** | |
| History | Know in which diseases nocturnal hypoventilation may develop<br>Be able to:<br>Obtain an accurate history to elicit symptoms suggestive of disordered sleep (eg, snoring, apnea, cor pulmonale, growth failure, daytime somnolence) |
| Physical | Be able to:<br>Identify physical signs suggestive of chronic hypoxemia |
| Diagnosis | Understand the role of sleep physiology studies (eg, polysomnography, pneumotachograph, respiratory inductance plethysmography,) together with pulse oxymetry and blood gas analysis in making a diagnosis |
| Management | Know which conditions may be managed by home ventilation support (eg, neuromuscular diseases, obstructive airways disease, cystic fibrosis, bronchopulmonary)<br>Know the advantages and disadvantages of home mechanical ventilation<br>Understand the ethical issues surrounding long-term ventilation support |

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| | Be able to:<br>Consult with physiotherapists to provide chest physiotherapy to prevent complications of chronic lung disease and ventilation difficulties<br>Refer to specialists for the provision of home ventilation if this is available in your locality |
| **Musculoskeletal deformities** ***(***see also ***Musculoskeletal Disorders*** and ***Neurology)***<br>By the end of training the resident should: | |
| Musculoskeletal problems (congenital musculoskeletal disorders, muscular dystrophies) | |
| History | Be able to:<br>Obtain an accurate history to identify how the a musculoskeletal deformity is interfering with a child's daily functioning<br>Elicit any history of progression of weakness in a child with muscular dystrophy |
| Physical | Be able to:<br>Identify the physical signs of birth injuries (eg, Erb Duchenne palsy), congential deformities (eg, talipes equino-varus), and intra-uterine positional deformities |
| Diagnosis | Be able to:<br>Differentiate fixed deformities from positional deformities in children with musculoskeletal problems<br>Identify evolving weakness patterns in children with muscular dystrophy |
| Management | Be able to:<br>Advise regarding prevention of secondary deformities at hip, ankle, and scoliosis in children with musculoskeletal deformities<br>Work with physiotherapist in planning an exercise regimen of stretching to improve positional deformities and to protect against the development of fixed deformities<br>Work with physiotherapist in planning splinting where it may be indicated<br>Emphasize the need of maintaining ambulation in children with musculoskeletal deformities |

## *Rehabilitation*

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| | Work with physiotherapist in planning a suitable for program for a child with muscular dystrophy |

## *Sports Medicine*

| **General**<br>By the end of training, the resident should: | |
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| History | Be able to:<br>Routinely make an assessment of the level of physical activity of a child whenever taking a history |
| Physical | Be able to:<br>Detect signs of evidence of excess or inadequate physical activity<br>Make an assessment of cardiovascular and respiratory function |
| Diagnosis | |
| Management | Have a basic understanding of exercise physiology including aerobic and anerobic respiration<br>Have a basic understanding of the energy transfer systems releasing energy from carbohydrates, fats and proteins<br>Know the basic cardio-respiratory responses to exercise<br>Know the basic principles of training upon cardio-respiratory, and neurophysiologic responses<br>Understand the benefits of regular exercise on health<br>Understand how health impacts upon a child's ability to exercise<br>Be able to:<br>Advise parents and children on healthy living and exercise in both fit children and those with chronic illness and disabilities |

| **Evaluation for sports participation**<br>By the end of training a resident should: | |
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| History | Be able to:<br>Elicit a history of any previous medical conditions that might limit a child's participation in sports<br>Identify any medications being taken by the child that may impact upon sports performance or participation |

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| | Identify any evidence of sudden death in the family which may indicate inherited cardiac disease<br>Identify health problems associated with competitive female athletes (eg, eating disorders, ammenorhea) |
| Physical | Know when a detailed cardio-respiratory assessment is required<br>Know about standardized questionnaires used in evaluation for sports participation<br>Be able to:<br>Assess musculoskeletal abnormalities that may have implications for participation in exercise<br>Detect signs of anabolic steroid use<br>Detect any signs of injury resulting from sport |
| Diagnosis | Be able to:<br>Select investigations to assess suitability for sports participation<br>Select investigations to assess for complications of sports participation (eg, bone densitometry, if available, for competitive female athletes) |
| Management | Know the regulations regarding eligibility and limitations for sports participation among various medical conditions<br>Have a basic understanding of the effects of environment on exercise (eg, heat, cold, altitude)<br>Understand the importance of skeletal maturity in determining the appropriate type of physical training<br>Be able to:<br>Identify which sports are appropriate for athletes with various conditions that may limit sports participation<br>Advise on the effects of febrile illness on sports participation<br>Advise families of children with various conditions that have an effect on sports participation (eg, diabetes, epilepsy) and the precautions that may be required during exercise<br>Advise on a child's suitability to participate in contact sports (eg, those with organ transplantation)<br>Give dietary advice on issues regarding exercise including appropriate diet and hydration<br>Discriminate between the advice needed for children who wish to participate in sport for recreation and |

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| | those who wish to participate competitively<br>Advise on the common sporting injuries associated with different sports<br>Provide advice about the suitability and side effects of using performance enhancing medications<br>Ascertain when it is appropriate to seek advice from sports medicine specialists to improve patient care or performance<br>Consult with specialists of children with chronic illnesses regarding their suitability for participation in sport where indicated<br>Collaborate with others (eg, family, child, school, trainer) in the care of a child playing a sport |

| **Exercise and population health** (see also ***Preventative Pediatrics***)<br>At the end of training a resident should: | |
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| History | Be able to:<br>Identify lifestyles that may influence health<br>Detect indicators that individuals or populations may be willing to change their lifestyle in order to improve health |
| Physical | |
| Diagnosis | |
| Management | Understand the relationship between the health of an individual and that of a community and vice versa<br>Understand the key local concerns about health of the community and its potential determinants<br>Understand the epidemiology of health and its relationship to exercise<br>Understand the principles behind strategies to use exercise to promote healthy lifestyle<br>Understand the importance of multi-agency involvement and team working in developing healthy lifestyle programs<br>Understand the principles of undertaking a needs assessment before implementing a lifestyle altering program<br>Understand the cultural influences upon developing programs for healthy lifestyles |

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| | Understand the influence of the media, the public, and schools policies on children's participation in sport and exercise<br>Understand the influence of the drinks and food industry in promoting exercise and exercise related products<br>Understand the local influence of national and international sporting events<br>Be aware of the research regarding the benefits of exercise<br>Be able to:<br>Provide leadership for the promotion of exercise in children<br>Provide practical guidance to others wishing to establish exercise programs for children |

| **Nutrition and Exercise** (see also ***Nutrition***)<br>At the end of training a resident should: | |
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| History | Be able to:<br>Obtain a detailed dietary history |
| Physical | Be able to:<br>Detect signs of obesity and eating disorders |
| Diagnosis | Be able to:<br>Select investigations of children suspected of having eating disorders or nutritional deficiencies |
| Management | Know the recommended daily allowances of macronutrients and energy in children of all ages and how this is influenced by participation in exercise<br>Know the principles of substrate utilization during exercise<br>Know the recommended fluid allowances for children of all ages and how this is influenced by participation in exercise<br>Understand the principles of hydration during exercise<br>Understand the importance of thirst in determining fluid requirements |

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| | Be able to:<br>Consult with a dietician in providing a suitable diet and exercise regime for overweight and obese children<br>Counsel families on appropriate diet and fluid requirements for those participating in exercise both for recreation and competitively |

| **Abdominal trauma (**see also ***Emergency Medical Care***) | |
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| History | Understand which sports may predispose to abdominal trauma |
| Physical | Be able to:<br>Perform an appropriate physical examination to assess for abdominal trauma |
| Diagnosis | Be able to:<br>Select appropriate diagnostic tests to assess abdominal trauma |
| Management | Know appropriate treatment for abdominal trauma and guidelines for referral to a specialist<br>Be able to:<br>Refer to specialists appropriately |

| **Musculoskeletal injury** (see also ***Musculoskeletal Disorders***)<br>By the end of training, the resident should: | |
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| Acute injury | |
| History | Be able to:<br>Identify symptoms suggestive of sprain, strain, and contusions |
| Physical | Be able to:<br>Identify swelling, deformity, numbness or weakness, limp, pain, joint locking, or instability |
| Diagnosis | Be able to:<br>Detect and classify sprains, strains, and contusions according to damage and pain intensity |

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| | Use radiographs appropriately for diagnosing injury |
| Management | Be able to:<br>Provide therapeutic plan for rehabilitating injuries |
| Overuse injuries | |
| History | Be able to:<br>Elicit factors in the history which may predispose to overuse injuries<br>Obtain a detailed history of training, equipment usage, and rehabilitation activities |
| Physical | Be able to:<br>Assess capillary refill, gross motor, and sensory function |
| Diagnosis | Be able to:<br>Formulate a differential diagnoses of musculoskeletal pain<br>Identify causative factors in the development of overuse injuries |
| Management | Be able to:<br>Identify the criteria for immediate attention and rapid orthopedic consultation<br>Prescribe adjustment of appropriate activities, realizing that curtailing of all activities is usually not necessary<br>Control pain and spasms |
| Growth plate injuries (Osteochondritis dissecans, avulsion fractures) | |
| History | Know areas on long bones most susceptible to injury<br>Know the most common presentation of growth plate injuries<br>Know the common sites of osteochondritis dissecans and avulsion fractures<br>Understand growth and susceptibility to injury for physis, apophysis, and epiphysis<br>Know the most common physeal injuries (eg, distal radius, phalangeal, and distal tibial fractures)<br>Know about factors affecting growth disturbance following growth plate injury |

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| | Be aware of the local activities most commonly associated with growth plate injuries (eg, skateboarding, bicycling, scooter riding)<br>Be familiar with the Salter Harris Classification system<br>Be able to:<br>Take an accurate history of the event leading to injury |
| Physical | Be able to:<br>Properly palpate areas of pain<br>Identify the common physical findings in osteochondritis dissecans |
| Diagnosis | Be able to:<br>Use radiographic modalities to inform a diagnosis |
| Management | Understand the goal of treatment to minimize pain and disability, and assist with rehabilitation<br>Be able to:<br>Refer to an orthopedic surgeon for further evaluation |
| Shoulder injuries (clavicale fractures, acromioclavicular separation, anterior dislocation, rotor cuff injury) | |
| History | Know most common causes and sites for shoulder injuries<br>Know the anatomy of the rotator cuff<br>Be able to:<br>Take an accurate history of the event leading to injury |
| Physical | Be able to:<br>Recognize tenderness at the acromioclavicular joint<br>Distinguish between the types of acromioclavicular joint injuries<br>Examine shoulder joint for normal and abnormal function<br>Locate abnormal sensation and examine biceps and deltoid muscles |

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| | Differentiate intensity of pain and its relationship with activity |
| Diagnosis | Be able to:<br>Utilize radiographs to inform a diagnose of shoulder injury |
| Management | Understand the management of displaced and non-displaced fractures<br>Be able to:<br>Recommend treatment including strengthening of muscles and preventive measures<br>Refer to a specialist when appropriate |
| Elbow injury (acute, chronic, overuse, medial/lateral pain) | |
| History | Know the most common dislocations and their mechanisms<br>Be aware of the local sports that are most commonly associated with elbow injuries (eg, tennis, boxing)<br>Understand the pathogenesis of elbow injury<br>Know common presenting features<br>Be able to:<br>Take an accurate history of the event leading to injury |
| Physical | Be able to:<br>Recognize obvious deformity<br>Identify tenderness along medial or lateral epicondyle |
| Diagnosis | Be able to:<br>Differentiate between acute and chronic injuries<br>Use radiographs to inform a diagnosis |
| Management | Know and recommend various preventive measures<br>Be able to: |

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| | Refer to a specialist when appropriate |
| Low back injuries (spondylolysis, lumbar disk herniation, acute lumbar strain, sacroilitis) | |
| History | Know the most common sites, mechanisms of injury, and the most commonly associated sports/exercises<br>Understand the nature of specific pain in the various areas of the back<br>Be able to:<br>Take an accurate history of the event leading to injury |
| Physical | Be able to:<br>Conduct single leg hyperextension, straight-leg raise, and/or Patrick test<br>Localize tenderness (eg, diffuse tenderness in the lateral spine) |
| Diagnosis | Understand the utility of oblique lumber spine radiograph<br>Understand the utility of MRI and back injury |
| Management | Know the utility of rest, analgesia, and physical therapy<br>Be able to:<br>Initiate activity restriction and rehabilitation<br>Refer to a specialist when appropriate |
| Hip and pelvis injuries (avulsion fractures, femoral neck stress fractures, osteitis pubis) | |
| History | Understand the development of pelvic growth plates<br>Know that a femoral neck stress fracture presents in the running athlete with vague anterior thigh pain<br>Know that osteitis pubis is more common in sports requiring more use of adductor muscles<br>Be able to:<br>Take an accurate history of the event leading to injury |
| Physical | Be able to:<br>Identify decreased strength and range of motion with avulsion fractures |

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| | Identify tenderness over the symphysis with osteitis pubis |
| Diagnosis | Know when to use MRI or bone scan findings to make diagnosis<br>Be able to:<br>Utilize radiographs to diagnosis fractures |
| Management | Be able to:<br>Prescribe ice, analgesics, and rest as appropriate<br>Consult with orthopedic specialist when necessary |
| Knee injuries (Posterior/anterior cruciate ligament injury, patellar dislocation, patello femoral stress syndrome, Osgood-Schlatter Disease, Sinding-Larsen-Johansson disease, patellar tendonopathy, ITB friction syndrome, shin splints) | |
| History | Understand the mechanisms of injury or dislocation in the patella<br>Know that patello femoral stress syndrome is the most common cause of anterior knee pain<br>Understand precipitating factors for pain<br>Know that Osgood-Schlatter Disease is traction apophysitis<br>Know that Sinding-Larsen-Johansson disease is traction apophysitis at inferior pole of patella<br>Know that ITB friction stress is the most common cause of chronic lateral knee pain<br>Be able to:<br>Take an accurate history of the event leading to injury |
| Physical | Be able to:<br>Demonstrate significant swelling and instability with cruciate ligament injuries<br>Evaluate stance and gait<br>Elicit medial patellar tenderness<br>Identify tenderness along ITB |
| Diagnosis | Recognize the importance of obtaining 4 views of tibia to diagnose shin splints |

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| | Understands the importance of bone scan and MRI<br>Be able to:<br>Formulate the differential diagnosis of hemarthrosis in knee injuries<br>Perform Ober test to diagnose ITB<br>Distinguish shin splints from tibial stress fracture |
| Management | Understand the importance of assessing and improving flexibility and strength with knee injuries<br>Know the importance of reduced overall activity initially<br>Know the importance of relative rest in patellar tendonopathy<br>Be able to:<br>Refer a patient with a suspected ACL tear to a specialist<br>Prescribe patella stabilizing device when appropriate |
| Ankle injuries | |
| History | Know that ankle injuries are the most common acute athletic injury<br>Be able to:<br>Take an accurate history of the event leading to injury |
| Physical | Be able to:<br>Evaluate neurovascular status<br>Inspect for edema, ecchymosis, and anatomic variants<br>Recognize the key sites for palpation<br>Assess active range of motion<br>Perform anterior drawer test and inversion stress test when appropriate<br>Assess peroneal tendon instability |

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| Diagnosis | Be familiar with the Ottawa ankle rules<br>Know when to do obtain a radiographic ankle series to inform diagnosis<br>Be able to:<br>Differentiate avulsion fracture of proximal 5th metatarsal from Jone's fracture |
| Management | Be able to:<br>Recommend to treat with ICE for first 48-72 hrs<br>Plan and initiate rehabilitation<br>Refer to a specialist when appropriate |
| Foot injuries (metatarsal stress fracture, Sever disease, plantar fasciitis) | |
| History | Know that pain is insidious and increases with activity<br>Know that Sever disease is calcaneal apophysitis<br>Know that plantar fasciitis is associated with heel pain and overactivity<br>Be able to:<br>Take an accurate history of the event leading to injury |
| Physical | Be able to:<br>Recognize point tenderness over metatarsal<br>Perform squeeze test for sever disease<br>Elicit tenderness on medial calcaneal tuberosity |
| Diagnosis | Know the use of radiographs in making foot injury diagnoses |
| Management | Be able to:<br>Advise relative rest for common foot injuries<br>Initiate relative rest, ice, massage, stretching, and strengthening of Achilles tendon<br>Emphasize importance of proper shoes for foot protection |

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| | Refer to a specialist when appropriate |

| **Head injury/Concussion** (see also ***Emergency Medical Care*** and ***Neurology***)<br>By the end of training, the resident should: | |
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| History | Know important features of concussions<br>Recognize sequelae of multiple concussion in an athlete<br>Know that concussion does not always include loss of consciousness<br>Be able to:<br>Take an accurate history of the event leading to injury |
| Physical | Be able to:<br>Evaluate coordination, concentration, short/long-term memory, and personality change |
| Diagnosis | Know that MRI and CT usually appear normal with head injury in sports trauma, especially concussion<br>Be able to:<br>Rule out other causes of symptoms<br>Utilize assessments (eg, Sport Concussion Assessment Tool – SCAT) to assess for concussion |
| Management | Be able to:<br>Monitor suspected concussion in patients within appropriate timeframes including recommendations for return to sports activity and importance of gradual progression to return to play<br>Provide appropriate follow-up to monitor on-going symptoms (eg, prolonged headache, amnesia, seizure)<br>Refer for formal neuropsychological assessment for suspected multiple-concussion or after one concussion with severe or persistent symptoms |

| **Neck injuries**<br>By the end of training, the resident should: |
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| History | Be able to:<br>Suspect neck fracture in the presence of complaints of midline cervical pain<br>Be able to:<br>Take an accurate history of the event leading to injury |
| Physical | Be able to:<br>Assess active flexion and extension |
| Diagnosis | Be able to:<br>Immobilize cervical spine and obtain various required views on CT or MRI<br>Differentiate between cervical sprain, strain, and contusion |
| Management | Be able to:<br>Immobilize neck in soft collar when necessary<br>Prescribe rest and anti-inflammatory medication as appropriate<br>Refer to a specialist when appropriate |

| **Heat injuries**<br>By the end of training, the resident should: | |
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| History | Understand why children are more susceptible than adults to heat injury<br>Be familiar with the different categories and important features of heat injury |
| Physical | Be able to:<br>Note differences in symptoms of cramps, syncope, edema, tetany, exhaustion, and stroke |
| Diagnosis | Be able to:<br>Differentiate between heat cramps, heat exhaustion, and heat stroke |
| Management | Be able to: |

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| | Manage cramps, syncope, edema, tetany, exhaustion, and stroke<br>Determine when to prescribe immediate whole body cooling in heat stroke and when to cease cooling<br>Provide appropriate intravenous fluids at adequate rates in various forms of heat injuries |

## *Behavioral and Mental Health*

| **General**<br>By the end of training, the resident should : | |
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| History | Understand normal emotional and behavioral development and how it may affect the child and family at different stages<br>Understand the inter-relationship between developmental difficulties, physical diseases and behavior<br>Be able to:<br>Elicit environmental and familial/family history and health dynamic factors that may have an influence on behavior |
| Physical | Be able to:<br>Assess the developmental spectrum of normal and abnormal behavior |
| Diagnosis | Know how to use standardized questionnaires for assessing behavior<br>Be able to:<br>Identify potential reasons for a child's difficult behavior<br>Recognize signs and symptoms that indicate serious conditions such as ADHD, autistic spectrum disorders, depression, and psychosis |
| Management | Be able to:<br>Support parents of children with emotional or mental health difficulties<br>Collaborate with school, family, and community for support and management<br>Manage common behavior problems such as temper tantrums, sleep problems, the crying baby, feeding difficulties, oppositional behavior, enuresis and encopresis, school refusal<br>Undertake the initial assessment and management of common causes of admission to hospital due to psychological distress such as self-harm and somatic symptoms of distress<br>Identify the need for specialized input in cases of serious emotional distress or mental illness<br>Consult with specialists from the mental health fields as appropriate to the situation |

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| | Counsel on appropriate parenting techniques |

| **Developmental stages**<br>By the end of training the resident should**:** | |
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| Pregnancy, birth, first days after birth | |
| History | Understand the importance of pre-natal preparation for parenthood<br>Be able to:<br>Identify features in the history which may influence maternal-infant attachment (eg, multiple births, hospitalization or congenital abnormalities) on preparation for parenthood |
| Physical | Be able to:<br>Identify healthy mother–infant bonding<br>Identify abnormal neonatal behavior such as may occur in children of mothers with drug abuse |
| Diagnosis | |
| Management | Be able to:<br>Direct parents to appropriate resources for support during the perinatal period and early infancy<br>Promote nursing policies that allow early and frequent contact between mother and infant<br>Counsel parents on issues around emotional attachment to their baby |
| Infancy (colic, feeding problems, crying, sleeping problems, rocking movements) | |
| History | Be able to:<br>Forumlate a diagnosis of colic from the history<br>Identify characteristics of infant temperament from the history<br>Distinguish normal variations in feeding from patterns that reflect poor parenting practices (eg, feeding to quiet the infant, propping the bottle) |
| Physical | Be able to: |

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| | Identify features of normal and abnormal infant behavior through observation |
| Diagnosis | Be able to:<br>Differentiate between rumination and gastrointestinal problems<br>Differentiate between normal and abnormal repetitive movements |
| Management | Be able to:<br>Counsel parents of an infant with feeding problems on developing appropriate feeding routines<br>Counsel parents on normal behavior such as frequency of crying at various ages (eg, up to three hours a day at 6 weeks of age)<br>Counsel parents on normal sleep and wakefulness pattern by age<br>Counsel parents on appropriate and inappropriate infant stimulation<br>Counsel parents against treatments for colic that are likely to be unhelpful<br>Plan a therapeutic program to manage colic<br>Rely upon parental counseling to address the temperamental characteristics of infants |
| Toddler and preschool (including feeding problems, toilet training, thumb sucking, biting, masturbation, temper tantrums, breath holding, head banging) | |
| History | Be able to:<br>Identify features in the history that may predispose to behavior problems (eg, family stress, parental over-concern) |
| Physical | Be able to:<br>Gain important diagnostic information on behavior and parent-child interactions through observation<br>Identify the signs of a neurophysiologic readiness for toilet training<br>Identify features associated with prolonged thumb sucking |
| Diagnosis | Be able to:<br>Identify potential causes of delayed toilet training |

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| | Differentiate between normal and abnormal behavior (eg, temper tantrums and oppositional defiant disorder)<br>Identify non-organic failure to thrive and limit investigations appropriately<br>Formulate the differential diagnosis of the causes of excessive masturbation (eg, sexual over-stimulation, environmental deprivation, genital disease) |
| Management | Understand that the appropriate age for toilet training is related to cultural influences, neurophysiologic readiness, and the child's motivation<br>Understand the clinical features and natural history of self-exploration and masturbation<br>Be able to:<br>Appropriately counsel parents about setting limits and positive reinforcement for toddlers<br>Advise and reassure parents about eating patterns of toddlers<br>Reassure parents about sleep problems including failure to settle and persistent waking, and advise on a suitable management plan<br>Advise parents on normal toilet training and develop a therapeutic plan for those children with delayed toilet training<br>Counsel parents on the natural history of thumb sucking and its management<br>Design a therapeutic program for the management of breath holding and temper tantrums<br>Develop a management plan for aggressive behavior (eg, hitting, biting) |
| Middle childhood (fears and phobias, school refusal , lying and stealing, sleep problems) | |
| History | Know the normal developmental progression of sleep patterns and night waking at different ages<br>Understand the association of night waking and separation anxiety<br>Be able to:<br>Identify features in the history that may predispose to behavioral problems (eg, problems with peers, school, home) |

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| | Identify factors leading to school phobia (eg, separation anxiety, specific phobias, low self esteem and problems with peer relationships)<br>Take an accurate history of a child's sleep pattern |
| Physical | Be able to:<br>Use observation of a child's behavior to supplement information from the history |
| Diagnosis | Be able to:<br>Identify school refusal as a source of somatic symptoms<br>Differentiate anxiety and truancy as a cause of poor school attendance<br>Distinguish between fears and phobias<br>Determine when lying and stealing indicate severe psychiatric disturbance<br>Distinguish between nightmares and night terrors |
| Management | Know when to seek further professional advice for behavioral management<br>Be able to:<br>Counsel parents on appropriate discipline in middle childhood<br>Develop a therapeutic plan for managing a child with bedtime refusal or frequent waking<br>Develop a plan for managing fears, nightmares and might terrors<br>Work with other professionals to encourage a child with school refusal to return to school<br>Counsel parents on appropriate sleep routines<br>Counsel parents about appropriate involvement of their children extracurricular activities such as music and sports (eg, under-involvement, over-competitiveness, socialization) |
| Adolescence (see ***Adolescent Medicine***) | |

| **Specific disorders**<br>By the end of training, the resident should**:** |
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## *Behavioral and Mental Health*

| Externalizing behaviors (aggressive, disruptive and anti-social behavior) | |
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| History | Know the associated signs of antisocial behavior (eg, poor school performance, truancy, poor self-esteem, low frustration tolerance)<br>Know that antisocial behavior may be indicative of other disorders (eg, depression, anxiety, psychosis)<br>Know that parental involvement with school and extracurricular activities, and knowledge about friends, are all protective factors for delinquency<br>Understand the epidemiology of bullying and the prevalence in your region<br>Understand that bullies are at risk for retaliatory behaviors<br>Know the common school problems associated with bullying (eg, academic failure, low interest, social problems)<br>Be able to:<br>Identify the constitutional (ie, temperament) and environmental (eg, role models, media, parenting) features that may pre-dispose to the development and maintenance of aggressive, disruptive, and anti-social behavior<br>Detect the environmental and biological contributions to the development and maintenance of delinquency and other antisocial behaviors |
| Physical | Be able to:<br>Observe child's behavior to supplement information from the history<br>Identify risk factors associated personality disorders |
| Diagnosis | Understand the appropriate use of rating scales, questionnaires, and psychological tests in the assessment of a child with aggressive behavior<br>Know the criteria for referral of a child with antisocial behavior<br>Understand the use of rating scales and questionnaires in the assessment of antisocial behaviors<br>Be able to:<br>Distinguish between normal childhood disobedience, oppositional defiance disorder and a conduct disorder<br>Distinguish between socialized behavior (in accord with peer group but not society) and un-socialized |

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| | behavior<br>Perform a behavioral evaluation of a child with antisocial behavior |
| Management | Understand the long term prognosis for various forms of aggressive behavior<br>Know when cognitive behavior intervention for management of aggressive behaviors is appropriate<br>Be able to:<br>Plan the management of aggressive behavior at different ages<br>Plan the appropriate evaluation and management of oppositional defiant and conduct disorder<br>Advise families, school, and/or childcare center on the management of various forms of aggressive behavior<br>Consult with specialists appropriately for management<br>Plan appropriate therapeutic options for managing antisocial behavior in an adolescent<br>Advocate for systems of intervention in local schools to reduce/prevent bullying |
| Internalizing behaviors and conditions (anxiety, mood, and affect disorders) | |
| Anxiety (including phobias, obsessive compulsive disorder and post traumatic stress disorder, reactive attachment disorder) | |
| History | Understand the epidemiology and natural history of anxiety disorders in children and adolescents<br>Understand that post-traumatic stress disorder may have a delayed onset following a traumatic event<br>Understand the risk factors for reactive attachment disorder<br>Be able to:<br>Identify the constitutional (ie, temperament) and environmental contributions to the etiology of anxiety related disorders<br>Identify the range of presentations of children with anxiety disorders<br>Identify co-morbidities associated with anxiety disorders |
| Physical | Be able to:<br>Use observation of a child's behavior to supplement information from the history |

## *Behavioral and Mental Health*

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| Diagnosis | Understand the use of rating scales and questionnaires in the assessment of anxiety behaviors<br>Be able to:<br>Differentiate typical worries from anxiety disorders |
| Management | Understand the importance of active outreach and screening for post-traumatic stress disorder in children and adolescents after a traumatic event (eg, school violence, environmental calamity)<br>Be able to:<br>Plan appropriately, the pharmacologic and non-pharmacologic management of phobias, anxiety disorders, post-traumatic stress disorder, and obsessive-compulsive disorder |
| Mood and affect disorders (depression, bi-polar disorder) | |
| History | Understand the epidemiology of depression in children and adolescents (eg, gender-based differences, age-based differences)<br>Understand the association of depression with chronic illness, and with substance use/abuse and sexual orientation problems<br>Understand that anxiety disorders often coexist with depressive disorders<br>Be able to:<br>Recognize the range of symptoms with which depressive disorders present (eg, fatigue, somatic complaints, school problems, acting out, irritability)<br>Detect symptoms suggestive of hypomania<br>Elicit environmental and biological (eg, genetic) contributors to the development of childhood depressive and bipolar disorders<br>Identify patients at risk of serious harm (eg, suicide) |
| Physical | Be able to:<br>Undertake a detailed and sensitive assessment of an adolescent with depressive symptoms |
| Diagnosis | Understand the role of rating scales and questionnaires for the assessment of depressive behaviors |

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| | Be able to:<br>Exclude physical illness associated with depression (eg, infectious mononucleosis or influenza)<br>Distinguish between depressive mood swings of a normal adolescent and major depressive disorder<br>Distinguish between a major depressive disorder, dysthymia, and brief grief reactions or adjustment disorder with depressed mood |
| Management | Understand the pharmacologic and non-pharmacologic treatment approaches to depression<br>Be able to:<br>Refer for specialist management when it is appropriate |
| Somatoform disorders (conversion, hypochondrias, somatization, malingering, pseudoseizures) | |
| History | Be able to:<br>Elicit the features of the symptoms that suggest an underlying somatiform disorder<br>Identify the most common physical complaints in somatoform disorders (ie, abdominal pains, headache and limb pains)<br>Identify risk factors associated with somatoform disorders (eg, stress)<br>Identify primary and secondary gain seen with somatoform disorders |
| Physical | Be able to:<br>Observe inconsistencies in reported symptoms and the physical signs |
| Diagnosis | Understand the criteria necessary to make a diagnosis (ie, DSM-IV)<br>Be able to:<br>Formulate the diagnosis and avoid unnecessary investigation<br>Distinguish between primary and secondary gain with conversion<br>Recognize that pseudoseizures are commonly associated with epilepsy |
| Management | Be able to: |

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| | Advise patients and parents on the legitimacy of the symptoms and distress they may cause<br>Consult with specialists regarding implementation of cognitive, behavioral, psychological, and/or family therapies as appropriate |
| Suicide and self-injury | |
| History | Know that publicity regarding suicide may prompt other adolescents to attempt suicide<br>Know the epidemiology of suicide attempts and mortality due to suicide<br>Understand that the psychological intent does not always correlate with the seriousness of the physical suicide attempt (ie, suicidal gestures must be taken seriously)<br>Know the risk factors associated with a poor prognosis for children and adolescents who have attempted suicide<br>Understand that self-poisoning after 6 years of age is not likely to be accidental, and may be a sign of suicide<br>Understand that self injurious behavior may occur in children with learning disability<br>Be able to:<br>Identify risk factors associated with suicidal behavior<br>identify protective factors for suicidal behavior (eg, religion, school engagement, family connectedness, coping strategies, firearms training and safe storage in the home)<br>Identify the behaviors that suggest a young person is at risk of suicide (eg, isolation from friends, giving things away)<br>Identify pre-existing psychiatric illnesses associated with suicide (eg, major depression, chronic anxiety, conduct disorder) |
| Physical | Be able to:<br>Observe physical and behavioral symptoms that may be suggestive of self-injury |
| Diagnosis | Be able to:<br>Identify a young person at risk for suicide or self-injurious behavior |
| Management | Understand the impact of attempted suicide upon the family |

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| | Be able to:<br>Consult with mental health specialists promptly in any child identified as being at risk of suicide |
| Eating disorders (see ***Adolescent Medicine***) | |
| Encopresis (see ***Gastroenterology and Hepatology***) | |
| Enuresis | |
| History | Understand the importance of a family history of nocturnal enuresis<br>Be able to:<br>Identify features in the history that may be responsible for secondary enuresis (eg, stressful events) |
| Physical | Be able to:<br>Identify any signs that may be associated with bladder dysfunction (eg, spinal abnormality, abnormal sensation) |
| Diagnosis | Be able to:<br>Distinguish between primary and secondary enuresis<br>Distinguish between nocturnal and diurnal enuresis<br>Exclude organic causes but avoid unnecessary investigation |
| Management | Be able to:<br>Implement appropriate behavioral and pharmacological therapies for both diurnal and nocturnal enuresis<br>Counsel parents about the side effects of pharmacological treatment and/or positive reinforcement |
| Attention Deficit Hyperactivity Disorder (ADHD) | |
| History | Understand the spectrum of symptoms that can occur with ADHD subtypes (ie, inattention, impulsivity, hyperactivity) and that different systems of classification place difference emphasis on the symptoms (eg, DSM-IV)<br>Know the natural history of the condition (ie, hyperactivity and impulsivity may decrease but inattention typically remains problematic over time and a proportion will have significant attention and behavioral impairment in adulthood) |

## *Behavioral and Mental Health*

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| | Be able to:<br>Identify the common presentations of ADHD at all ages<br>Identify the impact of symptoms in the home, school and social<br>Identify any coexisting conditions (eg, oppositional defiant disorder, conduct disorder, anxiety, depression, learning disabilities) or CNS based chronic conditions with increased risk of ADHD<br>Seek standardized observer (eg, teachers and parents) reports from more than one setting |
| Physical | Understand that observation of behavior in a physician's office may not reflect the symptoms demonstrated in other situations<br>Be able to:<br>Identify anxiety or depression when present as hyperactivity or inattention<br>Identify clinical findings that would suggest other etiologies |
| Diagnosis | Know that symptoms should be consistently present for at least six months to make the diagnosis<br>Know that the diagnosis of ADHD cannot be made by use of a specific test nor by the use of rating scales or observation alone<br>Be able to:<br>Formulate the differential diagnosis of a child presenting with behavior problems in school<br>Properly use diagnostic studies to evaluate disorders of attention (eg, educational and performance tests)<br>Use rating scales to assist making the diagnosis<br>Use IQ testing if suspected or confirmed accompanied learning problems<br>Interpret and correlate tests results with clinical observation |
| Management | Be able to:<br>Advocate a multi-modal approach involving drug treatment, psycho-social educational and parenting skills program, and individual or group work with the child |

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| | Prescribe stimulant medications appropriately when necessary to improve attention<br><br>Contact the school, with the parent or carer's consent, to explain the diagnosis, severity of symptoms and impairment, the care plan and any special educational needs.<br><br>Refer for psychotherapy as necessary<br><br>Evaluate the side effects of medication on regular basis<br><br>Provide relevant, age-appropriate written information to people with ADHD and their families and carers about diagnosis, assessment, support, self-help, psychological treatment, drug treatment and possible side effects. |
| Chronic Fatigue Syndrome/myalgic encephalitis (CFS/ME) (see ***Neurology***) | |

## *Genetics*

| **General**<br>By the end of training, the resident should: | |
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| History | Understand the scientific basis of chromosomal disorders and inheritance<br>Understand the concept of multi-factorial inheritance<br>Understand the environmental factors which may affect prenatal development (eg, role of folic acid and other nutritional supplements, maternal substance use)<br>Understand that increased identification of genetic defects has greatly expanded the understanding of the clinical spectrum of diseases<br>Understand the concepts of deletion, translocation, duplications and inversion and their significance<br>Be able to:<br>Construct a family tree and interpret patterns of inheritance including autosomal dominant, autosomal recessive, X linked , complete and incomplete penetrance, matrilineal, mulifactorial<br>Obtain a detailed history of symptoms and signs present in varyingly affected members to determine the complete clinical spectrum<br>Elicit environmental factors which may have influenced genetic development |
| Physical | Be able to:<br>Identify the clinical signs of common inherited disorders |
| Diagnosis | Know the processes involved in establishing and presenting the diagnosis of a genetic disorder to parents prenatally and the ethical dilemmas they pose<br>Know that increased alfa feto protein is available in some genetic conditions (eg, Downs and trisomy 18)<br>Know that ultrasonography can be used to detect major fetal anomalies as early as 16 weeks' gestation and may lead to an early suspicion of a genetic disorder<br>Know the invasive types of prenatal genetic investigations ( eg, preimplantation genetic diagnosis; chronic villus sampling; amniocentesis; prenatal umbilical blood sampling) |

## *Genetics*

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| | Know the common genetic disorders that can be diagnosed pre-natally (eg, Down's syndrome, sickle cell disease, thalassemia, cystic fibrosis, muscular dystrophy, fragile X)<br><br>Have an understanding of the ethical dilemmas and the implications of pre-symptomatic or carrier testing in children<br><br>Understand the basis of molecular genetics<br><br>Know about fluorescent in situ hybridization (FISH),its role in diagnosing small chromosome deletions, and common gene defects that can be diagnosed by this technique<br><br>Know that comparative genomic hybridization has replaced high-resolution chromosome analysis to screen patients suspected of having a chromosome abnormality<br><br>Be able to:<br><br>Select chromosome investigations for appropriate indications (eg, intellectual disability, multiple congenital abnormalities, intersex conditions, gross failure to thrive, some malignancies)<br><br>Select the appropriate investigation (eg, karyotype, FISH, comparative genomic hybridization) |
| Management | Have an awareness of the use and non-directive nature of genetic counseling<br><br>Be able to:<br><br>Explain inheritance patterns to families<br><br>Counsel families of the risk with subsequent pregnancies when an infant is born with a chromosome abnormality<br><br>Explain that carriers of genetic abnormalities such as inversions are usually normal but may have an increased risk of miscarriages and chromosomally abnormal offspring<br><br>Explain the risks of having another child with Down syndrome is greater for a young woman who is a balanced translocation carrier than for a middle-age woman<br><br>Explain the value and limitation of chromosome investigations in a child with an unknown disorder |

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| | Consult with geneticists appropriately for both diagnosis and counseling |

| **Chromosomal abnormalities** (see also ***Critical Care in Neonates***)<br>By the end of training, the resident should: | |
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| Autosomal | |
| Trisomy 13, 18, 21 | |
| History | Know that the most common abnormalities of chromosome number are trisomy conditions<br>Know that trisomy 21 (ie, Down Syndrome) is the most common trisomy disorder<br>Know the associated medical problems in children with trisomy disorders (13, 18, and 21) |
| Physical | Be able to:<br>Recognize the physical findings associated with trisomy 13, 18, and 21 |
| Diagnosis | Be able to:<br>Identify and diagnose the prominent features of trisomy 13, 18, and 21 in a newborn infant |
| Management | Be able to:<br>Respond appropriately when the diagnosis of a trisomy disorder (13, 18 or 21) is suspected at delivery or on the postnatal wards<br>Arrange appropriate investigations, consultations, and referral for a newborn with a trisomy disorder (13, 18 or 21)<br>Provide anticipatory guidance and preventive health maintenance guidelines for children with trisomy 21 |
| Contiguous gene syndromes (eg, Prader-Willi, Angelman, Beckwith-Wiedemann, and DiGeorge) | |
| History | Understand the implications of contiguous gene syndromes<br>Understand that contiguous gene syndromes can cause syndromes with multiple apparent unconnected defects (eg, Angelman, Prader-Willi) |

## *Genetics*

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| | Understand the cause(s) of contiguous gene syndromes |
| Physical | Be able to:<br>Recognize physical findings associated with DiGeorge syndrome (eg, congenital heart disease, esophageal atresia, hypertelorism, mandibular hypoplasia and low set ears)<br>Recognize physical findings associated with Prader-Willi syndrome (eg, mental retardation, hypogonadism, hypotonia, obesity, characteristic facial appearance)<br>Recognize physical findings associated with Angelman syndrome (eg, mental retardation, absent speech, seizures, inappropriate laughter, peculiar gait)<br>Recognize physical findings associated with Beckwith-Widemann syndrome (eg, macroglossia, hepatosplenemegaly, nephromegaly hypoglycemia) |
| Diagnosis | Be able to:<br>Formulate a differential diagnosis for Beckwith-Wiedemann, Angleman and Prader-Willi syndrome from the history and physical examination<br>Confirm the diagnosis of Prader-Willi syndrome and Angelman syndrome by molecular genetic testing |
| Management | Be able to:<br>Plan the management of contiguous gene syndromes<br>Consult with geneticists appropriately for both diagnosis and counseling |
| Sex chromosomes | |
| Turner syndrome | |
| History | Know that gonadal dysgenesis is uniformly present in Turner syndrome<br>Know that later findings of Turner's includes short stature, shield chest with widely spaced nipples, amenorrhea, and infertility<br>Know that fragile X syndrome is associated with X-linked mental retardation |
| Physical | Be able to: |

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| | Recognize the physical findings in the newborn which may include webbing of the neck, edema of hands and feet, triangular face, and coarctation of the aorta<br>Recognize the features of the Turner phenotype in a newborn infant |
| Diagnosis | Be able to:<br>Order appropriate chromosomal analysis in order to make a definitive diagnosis of Turner syndrome<br>Utilize appropriate screening tests (eg, echocardiogram, abdominal ultrasound)<br>Recognize that growth retardation may be the only clinical manifestation of Turner syndrome |
| Management | Be able to:<br>Obtain consult to provide growth hormone as a possible treatment for short stature seen in Turner syndrome<br>Follow accepted management guidelines for Turner syndrome |
| Klinefelter syndrome | |
| History | Know that the incidence in the male newborn population for 47, XXY type is ~ 1/600<br>Know that 1% of males with mental retardation have Klinefelter syndrome<br>Know that the characteristic findings generally appear after puberty |
| Physical | Be able to:<br>Identify the major clinical manifestations of Klinefelter syndrome |
| Diagnosis | Be able to:<br>Utilize chromosomal analysis to make a diagnosis of Klinefelter syndrome |
| Management | Be able to:<br>Follow accepted management guidelines for Klinefelter syndrome |

**Genetic abnormalities**

## *Genetics*

| By the end of training, the resident should: | |
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| Short stature (see ***Endocrinology***) | |
| Overgrowth syndromes (see ***Endocrinology***) | |
| Neuromuscular disorders (see ***Neurology***) | |
| Facial and limb abnormalities (see also ***Musculoskeletal Disorders***) | |
| History | Know that upper airway obstruction caused by glossoptosis may cause cor pulmonale in infants with Pierre-Robin sequence<br>Know that Treacher Collins syndrome is due to a single gene defect<br>Know that the features of Pierre-Robin sequence are secondary to micrognathia |
| Physical | Be able to:<br>Identify the clinical features of Treacher Collins syndrome<br>Recognize the clinical features of Thrombocytopenia Absent Radius and Fanconi syndromes |
| Diagnosis | Be able to:<br>Identify and diagnose the prominent features of selected facial and limb abnormalities |
| Management | Be able to:<br>Arrange for the appropriate consultations in children with facial and limb abnormalities |
| Osteochondrodysplasia (see also ***Musculoskeletal Disorders***) | |
| History | Know that chondrodysplasias are a result of gene mutations which are essential for skeletal development and growth<br>Be aware that in most cases non-skeletal tissues are involved |
| Physical | Know that disproportionate short stature hallmark of chondropysplasias |
| Craniosynostosis (see also ***Neurology***) | |
| History | Be aware that 10-20% of children with genetic syndromes have craniosynostosis |
| Storage disorders (see ***Metabolism***) | |
| Hamartoses (see also ***Dermatology***) | |

## *Genetics*

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| History | Know that hypothalamic Hamartoses are the most common brain lesion causing true precocious puberty |

| **Clinical approach to the dysmorphic newborn/child**<br>By the end of training, the resident should: | |
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| History | Understand the risks of and cultural issues posed by consanguinity<br>Be aware of environmental factors which may affect pre-natal development (eg, alcohol and drugs) |
| Physical | Be able to:<br>Assess a dysmorphic newborn/child<br>Recognize features suggesting dysmorphic or genetic syndromes and to identify associated anomalies |
| Diagnosis | Be able to:<br>Investigate common malformation or deformation syndromes and identify associated anomalies<br>Establish and present the diagnosis to parents |
| Management | Be able to:<br>Provide appropriate information to parents<br>Consult with fetal medicine specialists, neonatologists, and pediatric surgeons as appropriate<br>Consult geneticist at appropriate times<br>Follow local and national protocols for the management of genetic disorders |

## *Growth and Development*

| **Growth including normal growth measurement, growth velocity and head circumference**<br>By the end of training, the resident should: | |
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| | Definitions for this section:<br>**L/HT = Length/Height**<br>**WT = Weight**<br>**HC = Head Circumference**<br>**BMI = Body/Mass Index**<br>**SGA = Small for Gestational Age** |
| History | Understand the effects of fetal growth restriction on long-term health<br>Be able to:<br>Identify the range of factors, biological, psychological, and social which influence normal growth from birth to puberty |
| Physical | Know that most full-term infants will regain their birth weight within two weeks<br>Know the normal head circumference of a full-term infant at birth<br>Be able to:<br>Assess growth at all stages of development using appropriate tools<br>Demonstrate the types of anthropometric measurements used in assessing nutritional status and discuss their value<br>Utilize body mass index in monitoring growth<br>Identify the growth pattern of acquired microcephaly<br>Identify normal and abnormal variations in head shape<br>Identify the growth pattern of familial macrocephaly<br>Advise parents about variants of normal head shape |
| Diagnosis | Understand the meaning, uses, and limitations of bone age |

## *Growth and Development*

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| | Be able to:<br>Distinguish between normal growth and abnormal growth by evaluating plots on a growth chart<br>Distinguish between hydrocephaly and macrocephaly |
| Management | Be able to:<br>Reassure families about normal growth patterns<br>Communicate to families the implications of abnormal growth<br>Communicate effectively with specialists when appropriate if growth is abnormal |

| **Developmental milestones**<br>By the end of training, the resident should: | |
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| General Milestones | |
| History | Know the definitions of fetal, newborn, infancy, preschool years, middle childhood and adolescence period<br>Be able to:<br>Identify specific health issues, diseases and disorders related to the various stages of growth and development<br>Describe the relationship between physical, emotional, intellectual, and social factors and their influence on development and health |
| Physical | Be able to:<br>Identify the normal developmental sequence for motor, adaptive, language, and social skills development from birth through childhood<br>identify key milestones by domain (ie, gross and fine motor, cognitive, communication and language)<br>Identify the range of normal development in all these areas and at all ages<br>Detect early, children with probable abnormal development |
| Diagnosis | Be able to: |

## *Growth and Development*

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| | Identify the proper diagnostic work-up for a child who does not meet the expected level of development |
| Management | Be able to:<br>Provide support to parents regarding "normal development" and direct them to reliable sources<br>Initiate management of abnormal development at all stages of development<br>Make a judgment about referral of children with abnormal developmental progress<br>Determine service needs and select optimal methods to support parents of children with abnormal progress |
| Neonatal milestones (birth thru 4 weeks) *(see also **Neonatal Care**)* | |
| History | Be able to:<br>Identify prenatal factors and peri- and postpartum influences that can affect growth and development of the newborn |
| Physical | Be able to:<br>Identify the normal developmental milestones for the neonatal period (eg, alerts to sound such as bell or voice, demonstrates visual preference for human face)<br>Identify warning signs that may signify the potential for abnormal development |
| Diagnosis | Be able to:<br>Initiate investigations that may influence development in the neonatal period |
| Management | Be able to:<br>Support healthy newborn development by optimal practices such as evaluating parent-infant interactions |
| Monthly milestones (0 – 24) | |
| History | Be able to:<br>Elicit a history of developmental milestones reached |
| Physical | *0-2 months*<br>Be able to: |

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| | Identify the normal motor developmental milestones for 2 months of age (eg, regards object, follows 180 degrees, lifts head and shoulders off bed in the prone position)<br><br>Identify the normal cognitive/behavioral developmental milestones for 2 months of age (eg, smiles socially, coo, makes reciprocal vocalizations)<br><br>Identify lack of visual fixation by 2 months of age as an abnormal sign<br><br>*2-6 months*<br><br>Be able to:<br><br>Identify the normal motor developmental milestones around 2 to 4 months (eg, steady head control while sitting, holds head up, bears weight on forearms in the prone position, pushes with feet when in standing position, reaches for objects)<br><br>Identify the normal cognitive/behavioral developmental milestones (eg, laughs out loud, squeals, initiates social interaction)<br><br>*4-6 months*<br><br>Be able to:<br><br>Detect lack of visual tracking or lack of steady head control while sitting by 4 to 6 months of age as abnormal<br><br>Identify the normal motor developmental milestones for 4 to 6 months (eg, transfers object from one hand to the other, rolls over in both directions, sits with support)<br><br>Identify the normal cognitive/behavioral developmental milestones by approximately 6 months (eg, turns directly to sound and voice, babbles consonant sounds, imitates speech sounds)<br><br>*6-12 months*<br><br>Know that inability to sit by 9 to 12 months of age is abnormal<br><br>Know that lack of babbling consonant sounds by 9 months of age is abnormal<br><br>Be able to:<br><br>Identify the normal motor developmental milestones around 9 months (eg, feeds self with fingers, plays gesture games (pat-a-cake), bangs two objects together, holds two objects at one time, grasps pellet-like |

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| | object with immature pincer, sits without support<br><br>Identify the normal cognitive/behavioral developmental milestones (eg, says "mama" and "dada" as nonspecific sounds (eg, repetitive consonants), understands his/her own name, recognizes common objects (eg, bottle) or people (eg, daddy)<br><br>Identify the normal motor developmental milestones that are typically in place by 9 to 12 months (eg, pulls to a stand and cruises, takes a few independent steps, neat pincer grasp of raisin or pellet)<br><br>Identify the normal cognitive/behavioral developmental milestones that occur in the 9 to 12 month range (eg, says "mama" and "dada" with specific meaning, says at least one specific word in addition to "mama" and "dada")<br><br>Detect abnormal signs such as failure to turn to sound or voice by 6 – 9 months of age<br><br>*12-18 months*<br><br>Know that inability to walk independently by 18 months of age is abnormal<br><br>Be able to:<br><br>Identify the gross normal motor developmental milestones for this age range (eg, gives and takes an object, drinks from a cup, draws a line with a crayon, walks independently, stoops to floor/recovers to standing position)<br><br>Identify the normal cognitive/behavioral developmental milestones for the 12 to 18 months period (eg, begin manipulating objects in interesting ways, play make-believe)<br><br>Identify the normal motor developmental milestones that are typically in place around 18 months (eg, feeds self with spoon, stacks tower of three cubes, runs, walks up steps with hand held)<br><br>Identify the normal cognitive/behavioral developmental milestones for the 12 to 18 month range (eg, imitates household tasks, says 7 to 10 words, uses words for wants or needs, identifies one or more body parts)<br><br>*18-24months*<br><br>Be able to:<br><br>Identify the normal motor developmental milestones that typically occur by 24 months of age (eg, washes |

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| | and dries hands, removes clothing, feeds self with spoon and fork, runs well, kicks ball, jumps with two feet off floor, throws big ball overhand)<br>Identify the normal cognitive/behavioral developmental milestones apparent by 24 months of age (eg, combines words into two- or three-word phrases, points to pictures named, uses vocabulary of 50+ words, uses personal pronouns in speech)<br>Identify that failure to use single words by 24 months of age is abnormal |
| Diagnosis | Be able to:<br>Initiate appropriate investigations to help make a diagnosis based upon the history and pattern of abnormal development observed |
| Management | Be able to:<br>Communicates findings and implications of developmental assessment to parents |
| Early Childhood Milestones (approximate ranges) | |
| History | Be able to:<br>Elicit a history of developmental milestones reached |
| Physical | *3 years*<br>Know that failure to speak in three-word sentences by 36 months of age is abnormal<br>Be able to:<br>Identify the normal motor developmental milestones for 36 months of age (eg, helps in dressing such as unbutton clothing and putting on shoes, copies a circle, stands momentarily on one foot)<br>Identify the normal cognitive/behavioral developmental milestones for 36 months of age (eg, speech is 75% intelligible, speaks in sentences of five to eight words, knows meaning of simple adjectives such as tired, hungry, and thirsty, knows age and gender<br>*4years*<br>Be able to:<br>Identify the normal motor developmental milestones for 4 years of age (eg, copies cross, draws simple figure |

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| | of a person [head plus one other body part], balances on one foot for 3 seconds)<br><br>Identify the normal cognitive/behavioral developmental milestones for 4 years of age (eg, complex pretend play, speech fully intelligible, asks questions, tells a story)<br><br>*5 years*<br><br>Be able to:<br><br>Identify the normal motor developmental milestones for 5 years of age (eg, dresses and undresses, draws a person with 6 body parts, skips with alternating feet)<br><br>Identify the normal cognitive/behavioral developmental milestones for 5 years of age (eg, plays board or card games, asks questions about word meaning, can names more than four colors)<br><br>*6 years*<br><br>Be able to:<br><br>Identify the normal motor developmental milestones for 6 years of age (eg, rides a bicycle)<br><br>identify the normal cognitive/behavioral developmental milestones for 6 years of age (eg, writes name, knows right from left across midline on command, knows color names, identifies letters and numbers) |
| Diagnosis | Be able to:<br><br>Initiate appropriate investigations to help make a diagnosis based upon the history and pattern of abnormal development observed |
| Management | Be able to:<br><br>Communicate findings and implications of developmental assessment to parents |
| Milestones for middle childhood period (6 to 11 years) | |
| History | Know that loss of deciduous (baby) teeth occurs and most permanent teeth have erupted<br><br>Understand the normal social, emotional, and moral development that occurs (eg, learning how to operate outside of the home and interact with an extended network of people, same-sex relationships are prominent, dealing with peer norms and social mores, identifying right and wrong on a higher moral plane ) |

## *Growth and Development*

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| Physical | Be able to:<br>Identify the indications of social readiness to attend school (eg, ability to separate from parents for several hours at a time, plays well with other children, takes turns, able to follow directions in a group activity)<br>Identify the normal motor developmental milestones for 6 to 11 years of age (eg, strength, coordination, and stamina increase, the ability to perform complex movements begins)<br>Identify the normal cognitive developmental milestones (eg, begins to move from the preoperational stages of cognition to concrete logical) |
| Diagnosis | Be able to:<br>Formulate a differential diagnosis for a child presenting with learning or social difficulties at this age |
| Management | Be able to:<br>Advise families and schools about a child's ability and limitations in those with social or learning disabilities |
| Milestones for the Adolescent period (see ***Adolescence***) | |

## *Language, Learning Disorders, and Sensory Disorders*

| **Language disorders**<br>By the end of training, the resident should: | |
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| General | |
| History | Know the causes of expressive and/or receptive delayed language development<br>Know that receptive language problems can indicate a broader problem and that language development in infancy and early childhood is a better predictor of cognitive function than motor development<br>Know that receptive language is the best predictor of intelligence in preschool children<br>Know the progression of speech intelligibility, and that deviation from that progression is abnormal (eg, understandable speech to strangers is 50% at ~2 years of age, 75% at ~3 years of age, 100% at ~4 years of age<br>Be able to:<br>Identify if a language disorder is an isolated problem or an indicator of a broader developmental problem<br>Identify any deviations from normal chronology of language development<br>Identify circumstances (eg, family history, environmental factors) that may influence language development |
| Physical | Be able to:<br>Perform a language assessment at appropriate stages in a developmental assessment<br>Identify abnormal speech and language patterns |
| Diagnosis | Understand the role of rating scales and questionnaires for assessment of language disorders<br>Be able to:<br>Be able to distinguish simple phonological delay from more significant disorders eg a problem with hearing, comprehension or cognition<br>Plan the diagnostic evaluation of any child who has not reached the expected speech milestones (babbling, single words and sentences) |
| Management | Know that all children with language delay should be referred for an audiological assessment<br>Be able to: |

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| | Plan the appropriate management of children of all ages with speech and language problems<br>Refer a child to a speech pathologist for evaluation of stuttering appropriately<br>Refer a child with speech difficulties to specialist as necessary (eg, speech therapist, psychologist) |

## *Language, Learning Disorders, and Sensory Disorders*

| **Learning disorders**<br>By the end of training the resident should: | |
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| Neurodevelopmental/intellectual impairment | |
| History | Understand the common causes of neurodevelopmental/intellectual impairment :<br>- prenatal (eg, infection, genetic anomalies, alcohol, inborn errors of metabolism)<br>- perinatal (eg, hypoxia, complications of preterm birth)<br>- postnatal (eg, acquired brain injury, severe environmental deprivation, severe malnutrition)<br>Know that children with neurological disorders have an increased incidence of neurodevelopmental/intellectual impairment<br>Understand the concepts of general learning difficulties, specific learning difficulties, and global developmental delay<br>Know the definition of intellectual impairment and understand the relationship between an impairment in intellectual learning other areas of development<br>Understand the relationships between neurodevelopmental/intellectual impairment and behavior (eg, attention difficulties)<br>Understand the relationships between emotional disorders and neurodevelopmental/intellectual impairment<br>Know that some impairments of learning may be temporary (as in post concussive syndrome)<br>Understand the vulnerability of a child with neurodevelopmental/intellectual impairment and their impact on social and emotional growth<br>Understand that the age of presentation varies with the severity of impairment(ie, more severe cases allow for earlier recognition)<br>Know that the majority of children with intellectual impairment are in the middle range of impairment<br>Know that mild intellectual impairment may not be recognized until the child enters school (ie, in kindergarten, or first or second grade) |

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| | Understand the factors that determine independence and productivity in a child with neurodevelopmental/intellectual impairment<br><br>Understand the importance of obtaining a family history in neurodevelopmental/intellectual impairment<br><br>Be able to:<br><br>Identify indicators in the history of neurodevelopment/intellectual impairments at all ages of presentation<br><br>Identify pre-disposing factors for neurodevelopmental/ intellectual impairment<br><br>Identify the effects of neurodevelopmental/intellectual impairment on school performance and educational attainment<br><br>Identify family and environmental factors other than neurodevelopmental/intellectual impairment that can cause academic underachievement<br><br>Identify medical problems that may present as complaints about school performance or behavior in children with neurodevelopmental/intellectual impairment (eg, chronic illness, complex partial or absence seizures, hearing or visual problems) |
| Physical | Be able to:<br><br>Perform a complete neurological and neurodevelopmental examination<br><br>Assess specific areas of learning difficulty (eg, speech, reading ,writing, memory, attention, co-ordination)<br><br>Identify dysmorphic features<br><br>Identify the physical stigmata of the most common genetic syndrome (eg, Fragile X, Fetal Alcohol, Trisomy 21 & William syndrome) |
| Diagnosis | Know the indications for genetic and metabolic testing<br><br>Understand the indications for and limitations of neuroimaging studies (eg, SPECT, PET, MRI)<br><br>Understand the indications for and limitations of educational and/or neuropsychological tests |

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| | Understand that as the discrepancy between verbal and performance IQ scores increases, so does the likelihood of learning/performance dysfunction in the child<br><br>Understand that both achievement tests and a test of intelligence are often indicated in the evaluation of children with learning difficulties<br><br>Know that low scores on achievement tests with normal overall intelligence may indicate learning disabilities<br><br>Understand that the predictive validity of intelligence testing increases with age<br><br>Know the factors that may influence performance on intelligence tests<br><br>Know the IQ ranges for each category of intellectual function on standardized IQ tests<br><br>Be able to:<br><br>Distinguish between intellectual impairment, specific learning difficulties and global developmental delay<br><br>Distinguish between mild and moderate intellectual impairment with regard to the potential for educational and independence/vocational achievement<br><br>Interpret results of IQ , achievement or adaptive skills tests<br><br>Interpret behavioral assessment tests<br><br>Formulate a differential diagnosis in a child who presents with neurodevelopmental/intellectual impairment<br><br>Identify factors that may affect prognosis in a child with neurodevelopmental/intellectual impairment |
| Management | Understand the general goals of early intervention programs for infants and preschool children with neurodevelopmental/intellectual impairments<br><br>Know the advantages and disadvantages of educational inclusion for children and youth with neurodevelopmental/intellectual impairments<br><br>Understand the educational settings for the children with neurodevelopmental/intellectual |

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| | impairments (eg, resource room, public or private tutoring) in your locality<br><br>Understand the availability of alternative strategies children with neurodevelopmental/intellectual impairments to circumvent weaknesses (eg, audio texts, oral testing, use of word processor spell check)<br><br>Understand that children with neurodevelopmental/intellectual impairments and/or autism spectrum disorder who have symptoms of hyperactivity and short attention span may respond to medication<br><br>Know how to effectively collaborate with families, schools, and specialists regarding cognitive issues<br><br>Understand the importance of extra curricular activities for the self esteem of children with neurodevelopmental/intellectual impairments<br><br>Know the advantages and disadvantages of educational inclusion and grade retention for children and youth with neurodevelopmental/intellectual impairments<br><br>Understand the utility of behavior modification approaches in the overall management of children with learning, developmental, and behavioral problems<br><br>Know the common stress points (or times) for parents in the life of their child with a neurodevelopmental/intellectual impairments (eg, transition from elementary school to middle school)<br><br>Know the types of community service available to the family with a child with a developmental, learning, and/or behavioral/mental health disorder<br><br>Understand the data regarding dietary intervention (eg, Feingold diet, sugar restriction, megavitamins, food allergy) for children with learning and behavioral problems and provide appropriate guidance<br><br>Understand the data regarding controversial perceptual/therapeutic interventions (eg, patterning, visual training exercises, sensory integration) for children with developmental disabilities and provide appropriate guidance<br><br>Understand the forces that drive parents of children with neurodevelopmental/intellectual impairments to non-standard treatments (eg, rapid solutions, frustration with medical/educational |

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| | systems, family pressure, finances)<br>Be able to:<br>Determine when psychological, educational, and medical evaluation of a child with poor school performance is required<br>Refer for appropriate behavioral intervention techniques to teach basic adaptive skills when appropriate<br>Refer to speech, occupational, and/or physical therapy when appropriate<br>Contribute to the processes of assessment of children with possible special educational needs<br>Counsel families on the potential for educational and independence/vocational achievement<br>Counsel families about the value of non standard therapies |
| Specific learning disorders (eg, dyslexia, dysgraphia , dyscalculia, dyspraxia ) | |
| History | Understand the possible range of learning disorders<br>Know that dyspraxia is a common manifestation of sensory integration dysfunction in children with learning disorders<br>Be able to:<br>Identify features in the history that suggest a child may have a specific learning disorder<br>Identify if this is an isolated problem or part of a broader developmental problem |
| Physical | Be able to:<br>Recognize signs consistent with dyslexia (eg, delayed speech, mixing up the sounds and syllables in long words, confusion of left versus right, difficulty telling time with a clock with hands)<br>Recognize signs of dysgraphia (eg, tight/awkward pencil grip, difficulty forming letters, illegible handwriting)<br>Recognize signs of dyscalculia (eg, poor memory of numbers, trouble recognizing groups and patterns, visual-spatial difficulties hinder comprehension of written mathematics) |

# *Nutrition*

| **General**<br>By the end of training, the resident should: | |
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| General | |
| History | Understand the family and cultural determinants that may influence dietary intake and that can affect growth<br>Understand the potential nutritional deficiencies that can occur at different ages<br>Understand the importance of emotional factors in feeding and nutrition, in particular over feeding and non-organic failure to thrive<br>Be able to:<br>Take a detailed dietary history<br>Identify dietary practices which place infants at risk for nutritional deficiency (eg, goat milk, vegetarian, single nutritional source)<br>Identify features which may affect absorption of nutrients (eg, diarrhea, steatorrhea affecting fat and fat soluble vitamin absorption, gut disease or surgery)<br>Identify any recent weight loss or weight gain |
| Physical | Be able to:<br>Make an accurate anthropometric assessment using a full range of measurements including height, weight, BMI, mid-arm circumference |
| Diagnosis | Understand the limitations of dietary assessment based on diaries or recall of intake<br>Be able to:<br>Consider weight loss or inadequate weight gain as a possible indicator of disease |
| Management | Know that the recommendations for the nutritional requirements for energy, protein, fat, carbohydrates, vitamins and minerals for term and pre-term infants, children, and adolescents vary depending on the defining agency |

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| | Know the various circumstances in which the nutritional requirements may change (eg, age, disease, activity)<br>Understand the relationship between nutritional status and disease<br>Understand the role of the nutritional support team (eg, specialist nurses, dieticians, psychologists, pharmacists, speech and language therapists) in managing feeding and nutrition in children<br>Know about the principles and methods of alternative methods of feeding (eg, via gastrostomy, nasogastric tube) and the common problems that may arise from them<br>Be able to:<br>Counsel families about age-appropriate dietary practices<br>Apply the principles of dietary supplementation in those with, or at risk of, dietary deficiencies (eg, vegetarian, vegan diets)<br>Identify a family needing nutritional support or advice<br>Consult effectively with specialists |

***For a comprehensive overview of infant feeding, please refer to the WHO***
***Model Chapter on Infant and Young Child***

| **Infant feeding**<br>By the end of training, the resident should: | |
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| Breast-feeding | |
| History | Understand the basic physiology of breast feeding<br>Understand the mother's desire and/or ability to breast feed<br>Know the causes of breast feeding problems |

## *Nutrition*

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| | Be able to:<br>Take a breast feeding history and identify any problems |
| Physical | Be able to:<br>Diagnose difficulties from observation of breast feeding |
| Diagnosis | Understand that the low vitamin K content of human milk may contribute to hemorrhagic disease of the newborn infant |
| Management | Be familiar with the characteristics and advantages of human milk<br>Know that human milk and colostrum contains antibodies including high concentrations of secretory IgA antibodies, which provide local gastrointestinal immunity against organisms<br>Know that there is a lower incidence of gastrointestinal infections in infants fed human milk compared to formula milk<br>Know that maternal ingestion of drugs with sedative properties has the potential to cause sedation in breast-feeding infants<br>Know the maternal systemic disorders and disorders of the breast that may contraindicate, or interfere with, breast-feeding<br>Be able to:<br>Communicate the importance of breast feeding to the mother<br>Support and advise breastfeeding mothers<br>Make appropriate recommendations to address feeding problems and faltering growth (eg, failure to thrive)<br>Advise on maternal drugs that will be contraindicated to breast feeding<br>Provide advice on the need for Vitamin D supplementation and the addition of iron to the infants diet at 4 to 6 months with breast feeding |

| Formula-feeding | |
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| History | Understand a mothers preference to formula feed<br>Be able to:<br>Elicit clues in the history suggestive of cow's milk protein intolerance (eg, timing of symptoms related to feeds, multiple affected systems respiratory, gut and skin, family history) |
| Physical | Be able to:<br>Recognize the signs of cows milk protein intolerance |
| Diagnosis | Understand that infants fed goat milk exclusively are prone to megaloblastic anemia due to folate deficiency<br>Know that soy is a potential allergen in gastrointestinal protein allergy and that it has a high phytoestrogen content<br>Be able to:<br>Differentiate between milk protein allergy and lactose intolerance |
| Management | Know which infant formulas contain lactose<br>Be familiar with the characteristics of standard cow and soy milk based infant formula<br>Know the indications for the use of protein hydrolysate formulas as well as other specific formulas (eg, high MCT/LCT ratio, low lactose high MCT/LCT ratio, low lactose)<br>Know the nutritional supplements, and their risks, that can be used to increase caloric density of formulas<br>Know the importance of the quality of fat content in pre- and full-term infant formulas<br>Be able to:<br>Collaborate with dieticians in managing a child with specific dietary needs |
| Introduction of solid food | |
| History | Understand the cultural influences on the timing of the introduction of solid foods |

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| | Know age-related changes in the ability to absorb and digest different nutrients<br>Be able to:<br>Obtain a dietary history on the timing and types of solid foods introduced |
| Physical | |
| Diagnosis | |
| Management | Know the appropriate age for initiating solid food and the appropriate sequence<br>Understand the consequences of initiating solid food prematurely<br>Understand the qualitative and quantitative differences between breast milk, formula milk, and cow's milk<br>Know the appropriate age at which cow milk and dairy products should be introduced into the diet<br>Be able to:<br>Advise a mother about appropriate complementary feeding |

| **Deficiency states and hypervitaminosis** (for Vitamin D deficient rickets see also ***Endocrinology***)<br>By the end of training, the resident should: | |
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| Micronutrient deficiency states (eg, iron, copper, zinc, calcium, phosphate, iodine, folate B12 and vitamins) | |
| History | Know a selection of dietary sources of micronutrients, the functions of those micronutrients, and the effects of their deficiencies<br>Understand that full-term neonates have adequate iron stores for the first 4 to 6 months of life although pre-term infants are at risk of deficiency<br>Know that pre-term infants and infants fed largely on cows milk are at risk of copper deficiency<br>Know that rickets may develop in rapidly growing premature infants with low intake of either calcium or phosphorus |

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| | Know the situations which pose a risk for zinc deficiency (eg, poor diet, increased losses from burns or protein losing enteropathies, reduced absorption as in acrodermatitis enteropathica)<br>Know the situations in which there is a risk of B12 deficiency (eg, vegan diet, ileal resection)<br>Understand the relationship between vitamin B12 deficiency and folate deficiency<br>Know that breast milk is deficient in vitamin D<br>Know the difference in preterm and full-term infant's ability to digest fat and absorb fat soluble vitamins<br>Know the risks associated with fat soluble vitamin deficiencies in diseases producing malabsorption<br>Understand the role of vitamin A in vision and immunity and its association with malnutrition<br>Be able to:<br>Identify from a dietary history a diet that is likely to be deficient in iron (eg, high milk content, low meat content, high phytate content)<br>Identify other risk factors for micronutrient deficiencies<br>Identify the symptoms of vitamin and mineral deficiencies |
| Physical | Be able to:<br>Identify the clinical signs of deficiencies of fat soluble vitamins: vitamin A (eg, night blindness, photophobia, Bitots spots on conjunctiva); vitamin D (eg, rickets); vitamin K (eg, spontaneous bleeding) vitamin E (eg, neurologic signs)<br>Identify anemia which may be a sign of iron folate or B12 deficiency |
| Diagnosis | Understand the difficulties in interpreting serum zinc levels and that a trial supplementation may be the best diagnostic test<br>Be able to: |

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| | Select and interpret measurement of iron status<br>Select appropriate investigations for the measurement of micronutrient deficiency according to the clinical condition<br>Interpret the radiologic findings in vitamin D deficiency rickets |
| Management | Know that vitamin A is retained in renal failure and that supplementation should not be given<br>Be able to:<br>Provide appropriate supplementation for infants and children with micronutrient deficiencies<br>Advise on dietary changes that may be helpful in preventing further deficiencies<br>Counsel families on appropriate diet to ensure adequate intake according to the age of the child and the clinical circumstances |
| Malnutrition (also refer to the WHO Ten Steps: http://www.who.int/nutrition/publications/guide_inpatient_text.pdf | |
| History | Know the definitions of malnutrition (acute and chronic), under-nutrition, underweight, stunting, and wasting<br>Know the prevalence of underweight, stunting and wasting in your country, region, and globally<br>Know that worldwide malnutrition affects 25% of the world's children and is responsible for 35% of all child deaths<br>Understand the burden of disease (mortality, morbidity) associated with malnutrition<br>Understand factors which pre-dispose to malnutrition worldwide and in your own locality<br>Understand the reciprocal relationships between infectious disease and malnutrition<br>Understand the relationship between chronic diseases and malnutrition<br>Understand the significance of appetite in classifying acute malnutrition<br>Be able to: |

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| | Identify risk factors for the development of malnutrition (eg, social, psychological, and medical)<br>Identify age groups of children who are more predisposed to malnutrition<br>Identify the immediate, underlying and basic causes of malnutrition (ie, UNICEF framework)<br>Identify social factors that contribute to the development of malnutrition |
| Physical | Be aware of classifications of malnutrition (eg, Wellcome, Waterlow, WHO)<br>Know the World Health Organization classification of moderate and severe malnutrition<br>Know the uses and limitations of mid- upper-arm circumference as an index of malnutrition<br>Understand the significance of edema and visible wasting in a child with malnutrition<br>Be able to:<br>Identify life-threatening signs associated with severe malnutrition (eg, hypotonia, hypothermia, poor capillary refill)<br>Undertake a full anthropometric assessment identifying features of malnutrition<br>Measure height, weight, mid-upper arm circumference accurately<br>Demonstrate the process of assessing a child with malnutrition<br>Identify the degree of malnutrition in a child<br>Identify the clinical features of severe acute malnutrition<br>Differentiate uncomplicated and complicated severe acute malnutrition<br>Identify the clinical features of non-oedematous (marasmic) and oedematous (kwashiorkor) malnutrition |
| Diagnosis | Understand the diagnostic approach to a child with severe acute malnutrition<br>Understand the indications, diagnostic value, and limitations of: complete blood count, urea and electrolytes, glucose, |

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| | blood culture, albumin, and HIV test.<br>Be able to:<br>Conduct and interpret an appetite test<br>Select investigations appropriately including those needed to identify associated nutritional deficiencies |
| Management | **<u>Emergency/Acute care</u>**<br>Be aware of the international or national guidelines that are available to manage severe acute malnutrition<br>Understand the principles of the WHO Ten Steps and different phases of the management of severe malnutrition<br>Understand the steps for identifying severely malnourished children who require in-patient treatment, and differentiate them from those children who can be treated on an out-patient basis<br>Understand the admission, referral, and discharge criteria to and from an out-patient severe acute malnutrition therapeutic program<br>Understand the dangers of administration of high protein and sodium in the first phase of the management of protein energy malnutrition<br>Know the content and understand the use of Formula 75 and Formula 100 therapeutic feeds and ready to use foods<br>Be able to:<br>Initiate the immediate management of a child with severe acute malnutrition<br>Manage a severely malnourished child with hypoglycemia, hypothermia, shock, dehydration or severe anemia<br>Prescribe medication appropriately for children with severe malnutrition including antibiotics, minerals and vitamins<br>Plan appropriate nutrition for a child with severe acute malnutrition<br>**<u>Chronic long term care</u>** |

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| | Understand the normal clinical progress of a child with severe acute malnutrition who is treated appropriately<br><br>Understand the factors that should be considered in a child with severe acute malnutrition child who is responding poorly to treatment<br><br>Understand the prognostic factors that determine the outcome of severe acute malnutrition and the reasons for the high on-going mortality/morbidity from severe acute malnutrition<br><br>Be able to:<br><br>Assess when a child with severe acute malnutrition can be safely discharged home from hospital<br><br>Explain the prognosis of a child treated for severe acute malnutrition to families and other health care workers<br><br>Provide appropriate advice/counseling for parents/caregivers of a child with severe acute malnutrition and explain how to continue care at home, including proper feeding and stimulation using play<br><br>Plan the long-term care of a child with severe acute malnutrition to include both health professional, family, and community support<br><br>**Prevention**<br><br>Be aware of chronic illnesses that may be associated with malnutrition (eg, gut diseases, chronic renal disease, and cystic fibrosis)<br><br>Be able to:<br><br>Discuss with families activities that are helpful in preventing malnutrition such as hygienic preparation and storage of food, breastfeeding, appropriate complementary feeding, immunization, and growth monitoring<br><br>Work collaboratively with others to prevent malnutrition through involvement in health promotion, growth monitoring, and community programs<br><br>Intervene early in children with chronic illnesses to prevent malnutrition |
| Hypervitaminosis | |

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| History | Know that chronic vitamin A toxicity causes damage to liver, muscle, eyes, and bones<br>Be able to:<br>Identify a history of vitamin supplementation that may result in hypervitaminosis<br>Identify symptoms suggestive of vitamin D toxicity (eg, abdominal pain due to constipation or renal stones) |
| Physical | Be able to:<br>Recognize the signs of hypervitaminosis A and D |
| Diagnosis | Be able to:<br>Confirm the diagnosis with appropriate laboratory testing<br>Identify nephrocalcinosis on xray if present |
| Management | Be able to:<br>Advise on management including discontinuation of supplementation |

| **Principles of nutritional support**<br>By the end of training, the resident should: | |
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| Infant and young child feeding (IYCF) support | |
| History | Know those clinical conditions that often require additional nutritional support<br>Know the complications of tube feeding<br>Be able to:<br>Identify whether nutritional support is likely to be indicated |
| Physical | Be able to:<br>Make an accurate anthropometric assessment |

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| | Regularly utilize these measurements to track expected growth<br>Assess proper placement of a nasogastric tube<br>Identify complications of gastrostomy /jejunostomy devices (eg, infection) |
| Diagnosis | Be able to:<br>Select radiological investigations to ensure enteral or parenteral feeding tubes/devices are correctly placed |
| Management | Understand that nutritional support should be provided where available by a multi-professional team including pediatricians, nurse specialists, pharmacists, and dieticians<br>Know the importance of  to using the gastrointestinal tract whenever possible when planning nutritional intervention<br>Know that small amounts of enteral feed can help prevent cholestasis and facilitate earlier re-introduction of enteral feeds<br>Know the advantages of enteral nutrition over parenteral nutrition<br>Understand the indications for providing enteral nutritional support<br>Know the indications for intermittent (ie, bolus) feeding as compared with continuous tube feeding<br>Know the indications for total parenteral nutrition or combined with enteral feeding<br>Know the complications of parenteral nutrition and how to monitor<br>Know the range of devices available in your locality for delivery of nutritional support (eg, nasogastric tubes, gastrostomy and jejunostomy devices, feeding pumps, central venous catheters, infusion pumps)<br>Be able to:<br>Initiate nutritional interventions before significant growth failure occurs<br>Select the appropriate enteral formula for nutritional support |

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| | Prescribe a parenteral feed of an appropriate composition<br>Counsel families on the advantages and risks of both enteral and parenteral nutrition<br>Train and support families to deliver home enteral and parenteral nutrition if resources are available<br>Collaborate with specialists where indicated to provide overall care<br>Appreciate the ethical dilemmas associated in the care of children with little or no prospect of re-establishing full enteral feeding |

| **Nutritional problems associated with acute and chronic illness**<br>By the end of training, the resident should: | |
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| History | Understand the particular nutritional requirements for children with malabsorption states including Celiac disease, cystic fibrosis, and protein losing enteropathy<br>Understand the particular nutritional requirements and deficiencies associated with other chronic disorders such as, chronic renal failure, Crohn disease, chronic liver disease, malignancies, and chronic neurologic disease<br>Understand the nutritional requirements for children with acute conditions such as acute illnesses, post surgery, and burns<br>Understand the importance of adequate nutrition for growth in children with chronic disease<br>Understand the mechanisms for the development of rickets in chronic renal and liver disease |
| Physical | Be able to:<br>Undertake a full anthropometric assessment<br>Identify any physical signs associated with nutritional deficiencies in children with acute and chronic illnesses |
| Diagnosis | Know that secondary lactose intolerance may be caused by acute gastroenteritis |

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| | Be able to:<br>Diagnose specific nutritional deficiencies associated with chronic diseases |
| Management | Understand the importance of early re-feeding on the nutritional status of a child with gastroenteritis<br>Understand the challenges in providing adequate calories when fluid intake is restricted as in chronic renal and cardiac disease<br>Understand the effects of a restricted diet for multiple food allergies on the nutritional adequacy of a patient's diet<br>Be able to:<br>Manage the nutritional requirements of children with acute and chronic illnesses in consultation with a dietician and specialist as indicated |

| **Obesity (prevention and management)** (see also ***Endocrinology***)<br>By the end of training, the resident should: | |
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| History | Understand the genetic risk factors for obesity<br>Understand the complications of obesity (eg, hypertension, type 2 diabetes, metabolic syndrome, polycystic ovary syndrome, dyslipidemia)<br>Know that parental and adolescent obesity are strong predictors of adulthood obesity,<br>Understand the lifestyle choices that may contribute to obesity, including inadequate physical activity and excessive “screen" time, (eg, TV, computer), and advise patients and parents accordingly<br>Understand that dietary in take reported by obese patients should be viewed with caution as there tends to be under-reporting<br>Know that pubertal manifestations may occur earlier than normal in obese children<br>Be able to: |

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| | Identify risk factors for obesity (eg, genetic, environmental including lifestyle and diet)<br>Identify any measures that have been taken to reduce weight<br>Identify the presentation of type 2 diabetes during childhood<br>Identify symptoms suggestive of sleep apnea<br>Obtain a drug history of any medications that may have contributed to obesity (eg, corticosteroids)<br>Identify features in the presentation which suggest serious pathology |
| Physical | Know that patients with moderate exogenous obesity are generally tall for age and that patients with endocrine causes of obesity are small for age<br>Understand and calculate the importance of body mass index (BMI) in identifying obesity<br>Understand the definitions of overweight and obesity in terms of body mass index (BMI)<br>Be able to:<br>Measure and interpret growth curves and BMI<br>Evaluate abdominal vs hip circumference<br>Detail pattern of obesity (whether generalized or central)<br>Identify acanthosis nigrans<br>Measure blood pressure<br>Identify clinical signs of genetic obesity syndromes |
| Diagnosis | Be able to:<br>Calculate BMI and use BMI charts to diagnose obesity<br>Rule out any other causes of obesity (eg, endocrinopathy, metabolic syndrome, polycystic ovarian syndrome) |

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| | Select genetic investigations appropriately<br>Select investigations to look at co-morbidities (eg, sleep studies, oral glucose tolerance test, lipids, livr function, chest xray, EKG) |
| Management | Understand which adolescents should receive in-depth medical assessments for the sequelae of obesity (eg, BMI > 95th percentile, BMI between 85th and 95th percentile with additional risk factors, or child and family seeking help)<br>Understand the possible adverse effects of "fad" or weight loss diets<br>Understand environmental factors contributing to obesity and how these might be altered<br>Know how to collaborate with the patient and family on a treatment plan for obesity (eg, motivational interviews)<br>Know that the most successful strategies in the management of obesity include a combination of modest dietary restriction, reductions in sedentary behavior and increases in lifestyle physical activity<br>Know that the focus of changes should be on the whole family and not just the child<br>Be aware of pharmacological and surgical treatments for obesity<br>Be able to:<br>Advise on interventional strategies involved in weight reduction<br>Counsel families on the long-term effects of obesity on health<br>Provide long-term follow-up and surveillance monitoring the treatment using body mass index charts<br>Manage the long-term effects of obesity on health<br>Manage the acute complications of obesity<br>Refer a patient with obesity to a specialist when necessary |

**Eating disorders (eg, obesity, anorexia nervosa/bulimia) (**see ***Adolescent Medicine***)

**Nutrition in athletes** (see ***Sports Medicine***)

Updates:
October 24, 2013 – Section on Malnutrition updated and revised

## *Psychosocial Functioning*

| **General** (see also ***Behavioral and Mental Health; Child Abuse and Neglect; Preventative Pediatrics***)<br>By the end of training, the resident should: | |
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| History | Know the normal psychosocial phases of development<br>Understand the social determinants of health<br>Understand the effects of cultural issues on health<br>Understand the effects of early environmental influences and genetic predispositions on psychosocial development<br>Understand the effects of stress on health, development and future lifestyles<br>Recognize the association between adverse child events and life span<br>Understand child health problems with social causes and those with social consequences<br>Understand the effect of socioeconomic stresses of family dynamics and thus child health<br>Understand the concepts of childhood resilience, the ability to develop normally despite adverse circumstances<br>Recognize the effect of a gifted child on family function<br>Be able to:<br>Identify features in the history that suggest that a child might be at risk of having abnormal psychosocial development (eg, genetic, environmental, chronic illness)<br>Identify features in the history that a child is experiencing symptoms related to adverse psychosocial environment |
| Physical | Be able to:<br>Detect signs of abnormal psychosocial development or stress from both appearance and behavior |
| Diagnosis | Be able to:<br>Exclude medical problems that may be responsible for the signs and symptoms |
| Management | Know how to advise parents about managing a gifted child (home, school, peers, socialization) |

## *Psychosocial Functioning*

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| | Be able to:<br>Act as an advocate for improvement of the social environment for children<br>Act as an advocate for reducing the sources, and mitigating against, the adverse effects of stress in children<br>Practice context-sensitive, community-based care among socially vulnerable populations<br>Advance the understanding of health problems in socially deprived populations<br>Identify priorities for early child development programs and policies to benefit the poorest children and reduce persistent inequalities<br>Counsel families on providing a healthy psychosocial environment for their children |
| **Family and Environmental issues**<br>By the end of training, the resident should: | |
| Adoption and foster care | |
| History | Understand the special healthcare needs of children requiring foster care<br>Understand the problems arising from the instability of children who need to move foster care placement regularly<br>Be able to:<br>Identify the medical, physical and needs of a child about to be placed in foster care<br>Identify medical, social and behavioral issues of a child in foster care |
| Physical | Be able to:<br>Undertake a thorough physical assessment of a child for preparation of an adoption and/or foster care |
| Diagnosis | Be able to:<br>Undertake any necessary diagnostic tests of current medical problems |
| Management | Understand the legal, social and practical aspects of the systems for foster care in his/her own locality<br>Understand the long-term issues for children placed in foster care |

## *Psychosocial Functioning*

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| | Be able to:<br>Identify the increased needs of children in foster or residential care<br>Undertake a full evaluation of a child destined for foster care placement and make recommendations<br>Consult with agencies and other professionals about children in care being adopted or placed in foster care<br>Support prospective parents for adoption and fostering and advise them on the medical and emotional needs of the children<br>Manage the transition of young people from foster care into the community |
| Family issues (parenting, sibling rivalry, discipline, media, divorce, death, violence) | |
| History | Understand the potential effects of TV and the Internet on a child's behavior<br>Understand that a child's developmental stage will have an effect upon the child's response to divorce or a blended family<br>Know the legal issues surrounding custody or divorce in his/her locality<br>Understand that the developmental stage of a child will have an impact on his/her response to a death in the family<br>Know the stages of grief<br>Know the effects of parental violence upon the child<br>Be able to:<br>Identify a child at risk of vulnerable child syndrome<br>Identify the models of discipline used in the household<br>Identify the TV and internet activities of a child<br>Identify the effects of a child's adjustment to divorce,separation or a new partner entering the family<br>Identify grief and the response to death in children of all ages<br>Identify evidence suggestive of violence in the household |

## *Psychosocial Functioning*

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| Physical | Be able to:<br>Observe family dynamics during a consultation |
| Diagnosis | Be able to:<br>Identify any evidence of psychosocial family problems |
| Management | Know the value of anticipatory guidance and the provision of information and support for critical life events<br>Understand the effects of divorce upon a child's subsequent intimate relationships<br>Be able to:<br>Provide anticipatory guidance to prevent vulnerable child syndrome<br>Counsel parents on avoidance and treatment of sibling rivalry<br>Assess parenting skills and recognize indications of unsatisfactory or unsafe parenting<br>Counsel parents on the value of positive re-inforcement on child development throughout childhood<br>Counsel parents on suitable TV viewing (time and content), internet and social networking for children of all ages<br>Support a child and family for whom a family memeber has a life threatening or terminal illness<br>Counsel a family and child after the death of a loved one |

| **Chronic illness and handicapping conditions**<br>By the end of training, the resident should: | |
|---|---|
| History | Understand the emotional impact of illness and hospitalization on children and their families<br>Understand the specific psychosocial issues involved in live transplantation<br>Be able to:<br>Identify effects of a chronic illness on family dynamics, siblings, marriage, and family economics |

## *Psychosocial Functioning*

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| | Identify any psychosocial effects associated with the use of home medical equipment (eg, limiting staying with friends) |
| Physical | Be able to:<br>Observe family dynamics during a consultation |
| Diagnosis | Be able to:<br>Identify any evidence of psychosocial family problems |
| Management | Be able to:<br>Support and be an advocate for families with children with chroinic and handicapping conditions<br>Provide anticipatory and ongoing guidance for families of children with chronic illness and handicapping conditions<br>Support the young person with a chronic illness and their family in transition to adult services |

| **Specific problems and conditions** |
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| Enuresis (see ***Behavioral and Mental Health***) |
| Encopresis (see ***Gastroenterology and Hepatology***) |
| Psychosomatic disorders (see ***Behavioral and Mental Health***) |
| Separation anxiety and school refusal (see ***Behavioral and Mental Health***) |
| Sleep disorders (see ***Behavioral and Mental Health***) |
| Rumination and cyclic vomiting (see ***Behavioral and Mental Health***) |
| Chronic Pain Syndrome (see ***Rheumatology***) |
| Chronic fatigue syndrome/myalgic encephalitis (CFS/ME) (see ***Neurology***) |
| Child abuse and neglect (see ***Child Abuse and Neglect***) |

## *Adolescent Medicine*

| General | |
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| History | Know the factors that dictate whether parents may accompany adolescents during the history and physical examination<br>Understand the interrelationships of adolescence involves a combination of biological, psychological and social development<br>Understand that the health burden of adolescence is related to emotional well being and deprivation, health risk behaviors, mental health and chronic illness<br>Be aware of the changing causes of mortality and morbidity of adolescents in your country<br>Be able to:<br>Identify social and behavioral factors in the history and how these impact upon relationship of family and peers<br>Obtain confidential sexual and substance use history during health care visits for an adolescent |
| Physical | Be able to:<br>Identify important nonverbal cues in communicating with young people |
| Diagnosis | |
| Management | Know the proportion of adolescents in the local population and the resources available for them<br>Be able to:<br>Demonstrate critical awareness of basic communication skills with young people including verbal and non verbal communication<br>Demonstrate awareness of the impact of the dramatic and rapid physical, cognitive and psychosocial changes of adolescence<br>Demonstrate the importance of routinely interviewing adolescents alone, without parents or other adults |

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| **Normal Puberty** (see also ***Endocrinology***)<br>At the end of training a resident should: | |
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| History | Know the range of age of the onset and duration of puberty among boys and girls<br>Know the sequence of development of secondary sexual characteristics in girls and boys<br>Know the average age and range at which menarche occurs in adolescent girls<br>Know that physiologic leukorrhea commonly precedes menses by three to six months<br>Know the relationship between genital sexual maturity rating and peak height velocity in girls and boys<br>Know the etiology of gynecomastia in boys, and that pubertal gynecomastia as well as breast development can be asymmetric and that neither indicates pathology<br>Understand the impact of relatively early or late puberty on adult height<br>Understand the changes in gonadotropin secretion during puberty<br>Be able to:<br>Identify genetic and environmental influences on the timing of puberty<br>Identify psychosocial risks for both precocious and delayed puberty in boys and girls |
| Physical | Be able to:<br>Assess accurately sexual maturity using SMR (Sexual Maturity Rating) stages<br>Identify clinical changes related to Adrenarche and Gonadarche<br>Recognize precocious and delayed puberty<br>Use methods for assessing the relationship of parental stature to an individual adolescent's stature |

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| Diagnosis | Understand the concept of bone age or skeletal maturity and how it is determined for clinical purposes<br>Be able to:<br>Interpret changing laboratory parameters (eg, hematocrit, alkaline phophatase and cholesterol) through puberty<br>Interpret a disparity between bone age and chronological age<br>Interpret blood pressure readings in relationship to height and age<br>Diagnose precocious puberty |
| Management | Know the rational behind the type of treatment used in the various causes (complete and incomplete) of precocious puberty<br>Be able to:<br>Reassure patients and parents about pubertal development if it is within the normal range<br>Explain to parents and patients the non-serious causes of delayed puberty (eg, constitutional delay)<br>Refer a patient with precocious puberty to an endocrinologist |

**Delayed puberty (**see ***Endocrinology***)

| **Psychological development including development of self identity, psychological separation from the family, relationship to peers, self image, family and media influences**<br>By the end of training, the resident should: | |
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| History | Understand the effect of rapid body changes on an adolescent's sense of self<br>Understand the variations in relationship between physical, emotional, intellectual, and social factors, and their combined influence on adolescent development |

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| | Know that emotional and cognitive development have definable tempo and do not parallel the rate of physical maturation<br><br>Know that some degree of rebellion against the family's image of the adolescent is part of the adolescent's development of self-identity<br><br>Understand emotional and cognitive development changes the way adolescents behave and socialize<br><br>Understand self-concept beliefs adolescents hold about themselves,influence self esteem<br><br>Understand the importance of a peer group as a means of establishing psychological separation from the family<br><br>Know that early adolescent (age 10-13) peer groups usually consists of those of the same sex with similar dress, grooming, and behavioral standards<br><br>Understand that peer groups have a powerful influence on adolescent's healthy and unhealthy behaviors (eg, smoking, alcohol, drugs, sex, risk-taking, safety, and school attitudes)<br><br>Understand that mid-adolescents (age 14-16) often have idealized relationships rather than true intimacy<br><br>Know that promotion of media imagery of behaviors (eg, violence, sexual promiscuity, tobacco use) influences attitudes towards these behaviors<br><br>Understand that exposure to media imagery of violence is a risk factor for aggressive behavior in adolescents<br><br>Be able to:<br><br>Conduct a psychosocial history using the HEADSS framework (home, education and employment, activities, drinks and drugs, sexuality and suicide)<br><br>Elicit the family dynamics in any routine history and identify the potential impact such dynamics may have on symptoms<br><br>Identify an adolescent "loner" who does not identify with any peers and who may have psychological difficulties |

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| | Identify an adolescent with a poor self-image which may correlate with many adolescent problems<br>Identify sources of stress and the modes of coping by adolescents and their families |
| Physical | Be able to:<br>Recognize the various styles of dress or behavior may be part of an adolescent's development of self-identity |
| Diagnosis | |
| Management | Understand that parental acceptance of an adolescent's separation from the family often precedes adolescents' achieving adult independence<br>Understand social media use patterns and the importance of balance, boundaries, and parental involvement in monitoring use by adolescents<br>Be able to:<br>Facilitate parents/family to foster positive self-image in adolescents by praise and acceptance |
| **Sexual development**<br>At the end of training a resident should: | |
| History | Understand that development and exploration of sexual feelings is a normal part of adolescent development<br>Understand that same and opposite-sex sexual feelings and behaviors has a strong impact on defining an adolescents sexual identity<br>Understand that gender identity may have many variations<br>Understand that adolescents with varied gender identity may face discrimination and stigma, and are at increased risk for deliberate self-harm, adjustment disorders, and other psychosocial problems<br>Understand that sexual assault is more common in adolescents than in any other group; it may be found in males or females; and the adolescent may be the victim or assailant |

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| | Know the options for post-coital contraception for the female rape victim and recognize when they should be used<br>Be able to:<br>Recognize the common patterns of sexual behavior and experimentation in adolescents of various ages<br>Recognize the features of post-traumatic stress disorder as associated with rape<br>Employ different strategies to be able to facilitate the exchange of information about inappropriate sexual behavior |
| Physical | Be able to:<br>Discuss sexual issues with adolescents in a sensitive and professional manner |
| Diagnosis | |
| Management | Understand that sexualized behavior in pre-pubertal children may indicate prior sexual abuse<br>Be able to:<br>Demonstrate respect for a young person's sexuality<br>Direct adolescent patients and their families to available confidential services<br>Counsel parents about the ranges of adolescent sexuality<br>Encourage parents to discuss sexuality and behavioral expectations with their adolescent offspring |
| **Cognitive development of adolescence**<br>At the end of training a resident should: | |
| History | Know that experience and environment can substantially influence cognitive development<br>Understand the implications of the concrete thinking that characterizes the early adolescent<br>Understand the limited ability of early adolescents to link cause and effect to the consequences of health behaviors (eg, smoking, overeating, alcohol and drug usage, reckless automobile driving) |

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| | Understand the limited ability of early adolescents to have a concept of long-range health risks (eg, cholesterol in diet, sedentary life-style)<br>Know that higher executive function (eg, decision making abilities) continues to mature through young adulthood<br>Know that abstract reasoning develops late in adolescence |
| Physical | Be able to:<br>Determine the level of cognitive reasoning of adolescents |
| Diagnosis | |
| Management | Be able to:<br>Utilize techniques to facilitate engaging effectively with adolescents (eg, confidentiality, non-judgmental questioning, approximation) appropriate to their level of cognitive development<br>Adapt explanations to the cognitive developmental level of the adolescent |

| **Adolescent nutrition issues** (see ***Nutrition***) |
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| **Preventive healthcare/self-care**<br>At the end of training a resident should: | |
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| History | Understand why health promotion is important in adolescence to reduce harm associated with exploratory behaviors<br>Understand the balance between exploratory risks behaviors and protective factors (personal, peer and family) which help an adolescent stay healthy despite adversity<br>Understand the importance of the family and peers in modeling adolescent behaviors<br>Understand the roles of societal and individual approaches to health promotion |

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| | Be able to:<br>Routinely include psychosocial and sexual history-taking with adolescents<br>Evaluate the family dynamics of adolescent patients<br>Evaluate the level of separation of the adolescent from their family and the influences upon it<br>Identify factors in the history that suggest an adolescent is at risk of unintentional or intentional injury<br>Identify those adolescents with poor self image that may make them especially vulnerable<br>Make a comprehensive assessment of an adolescent risk taking behaviors |
| Physical | |
| Diagnosis | |
| Management | Understand the principles of youth programs, and specific peer and family intervention used in health promotion<br>Be able to:<br>Encourage adolescents appropriately and sensitively to increase their responsibility for self care<br>Counsel adolescents against risk taking behaviors<br>Counsel parents how to approach their adolescent offspring who is undertaking, or at risk of undertaking, risk taking behaviors<br>Direct adolescents and their families to services designed to support young people in preventative health care<br>Make positive use of media to which the adolescent is most likely to be receptive (eg, social networking sites, text messaging) |

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| **Gynecology general** (see ***Gynecology***) |

| **Vaginal discharge** (see ***Gynecology***) |
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| **Dysfunctional uterine bleeding** (see ***Gynecology***) |
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| **Amenorrhea** (see ***Gynecology***) |
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| **Dysmenorrhea** (see ***Gynecology***) |
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| **Pregnancy** (see ***Gynecology***) |
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| **Pregnancy prevention** (see ***Gynecology***: **contraception**) |
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| **Sexually transmitted infections, including HIV** (see also ***Infectious Diseases***)<br>At the end of training a resident should: | |
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| History | Know the natural history of the causative organisms of sexually transmitted infections in adolescence (eg, trichomoniasis, chlamydial infection, gonorrhea, herpes, syphilis, HIV, human papillomavirus)<br>Know that the most common microbiology of pelvic inflammatory disease, cervicitis, and vaginitis<br>Know that trichomoniasis and genital warts are often asymptomatic in adolescent boys<br>Know that pelvic inflammatory disease is a risk factor for subsequent ectopic pregnancy and infertility<br>Understand the increased risk and prevalence of HIV and other STIs in adolescents with any other STI |
| Physical | Be able to:<br>Recognize the clinical characteristics of bacterial vaginosis<br>Identify the clinical manifestations of cervicitis and acute urethritis |

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| | Identify the clinical characteristics of pelvic inflammatory disease |
| Diagnosis | Be able to:<br>Formulate the differential diagnosis of vaginosis and cervicitis in adolescent girls<br>Formulate the differential diagnosis of urethritis in adolescent boys<br>Use proper laboratory tests for pelvic inflammatory disease |
| Management | Know the relationship between contraceptive choice and the prevention of sexually transmitted diseases, including HIV/AIDS<br>Understand the role of immunization in the prevention of HPV<br>Know the indications for cervical cancer screening in adolescence<br>Understand the importance and frequency of screening for sexually transmitted infections based on risk factors<br>Be able to:<br>Implement the current recommended treatment regimens for pelvic inflammatory disease<br>Implement the acceptable treatment alternatives for genital warts<br>Implement the appropriate treatment of urethritis in adolescent boys<br>Implement oral acyclovir treatment for genital herpes and understand its limitations<br>Refer for hospitalization of an adolescent with pelvic inflammatory disease when indicated<br>Counsel adolescents about the necessity of condom use during anal as well as vaginal intercourse<br>Participate in local screening programs for detection and prevention of sexually transmitted diseases and cervical cancer |

| **Chronic illness and transition** |
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| At the end of training a resident should: | |
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| History | Understand the relationship between learning and physical disability, chronic illness, adjustment, and psychopathology in adolescence<br><br>Understand the barriers to adherence in chronically ill patients, including time and financial costs, pain, inconvenience, embarrassment, and/or acknowledgment of personal vulnerability<br><br>Be able to:<br><br>Detect features in the history that suggest risk for lack of adherence to treatment<br><br>Identify issues in the history that may prevent a successful transition into adult services for those adolescents with chronic illness<br><br>Undertake an assessment of educational and vocational milestones to determine vocational readiness |
| Physical | Be able to:<br><br>Undertake a sensitive physical examination taking into account the adolescent's self image in relationship to signs of chronic disease |
| Diagnosis | |
| Management | Be aware of local disability legislation and how this impacts upon the young person<br><br>Be able to:<br><br>Take into account the need to sometimes change established behaviors when establishing a treatment plan with adolescents<br><br>Respect the autonomy of the adolescent in negotiating treatment plans<br><br>Respect that parents of chronically ill adolescents may have difficulty allowing their children to take control of their own healthcare management<br><br>Initiate treatment plans that recognize the importance of patient and family centered care in providing |

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| | quality care to adolescents with chronic or special health care needs<br>Take into account the physical and psychosocial issues of life transition for an adolescent with a chronic illness or disability<br>Plan appropriate transition pathways for adolescents with chronic illness and disability to avoid disruptions of care<br>Prepare together with other members of the multi-disciplinary team, a young person with a chronic illness, and their family, for transition to adult services<br>Work in partnership with other professionals and agencies to plan support and care for adolescents with chronic illness<br>Advise schools and other agencies on the impact of chronic illness on an adolescents ability to partake in education and training |

| **Eating disorders: anorexia & bulimia** (see also ***Nutrition***)<br>At the end of training a resident should: | |
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| History | Know that amenorrhea is an early warning sign of anorexia nervosa<br>Know that obesity or an obsession about thinness can be a predecessor of anorexia nervosa or bulimia<br>Be able to:<br>Distinguish features in the history that suggest that weight loss is due to self induced starvation and not another cause<br>Elicit evidence of the adolescent's distorted self body image<br>Detect evidence suggestive of other activities to promote weight loss such as exercise and laxative abuse |
| Physical | Be able to: |

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| | Identify physical features including hair, skin and cardiovascular changes seen in anorexia |
| Diagnosis | Know the characteristics of anorexia nervosa and/or bulimia and the criteria for diagnosis<br>Know that menstrual irregularity is not a diagnostic criterion for bulimia<br>Be able to:<br>Form a differential diagnosis in those with a history and examination suggestive of anorexia nervosa, bulimia, and other eating disorders<br>Plan screening evaluation for metabolic, cardiac, and electrolyte abnormalities in eating disorders |
| Management | Know the factors affecting the prognosis for adolescents with anorexia nervosa and/or bulimia<br>Be able to:<br>Facilitate adolescents and families to acknowledge the presence of an eating disorder<br>Working with others, implement a treatment plan for eating disorders including medical, nutritional, and psychological aspects<br>Refer adolescents with anorexia nervosa and/or bulimia for hospitalization when indicated<br>Recognize the complications associated with anorexia and bulimia |

| **Behavioral health issues including adherence, risk taking, violence, stress, fatigue and psychosomatic conditions**<br>At the end of training a resident should: | |
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| History | Know the leading causes of death and injury among adolescents in the local and national environment<br>Know that unsafe handling of firearms is a leading cause of death in adolescents in some parts of the world<br>Know that the risk of sexual assault is higher in adolescents regardless of gender, and the adolescent may be victim or assailant<br>Understand that healthy risk taking may promote mastery and positive self-esteem, and that unhealthy risk-taking |

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| | is associated with adverse health and social outcomes<br>Understand the sleep requirements of adolescents and that sleep deprivation may present as mental health or behavioral problems<br>Be able to:<br>Identify the behavioral changes common with the onset of early adolescence (eg, fatigue, increased sleeping, irritability, secretiveness)<br>Identify the features of an illness and its management that tend to worsen a patient's adherence to treatment (eg, more than one treatment, side effects of treatment, multiple daily medication doses)<br>Identify that some aggressive negative behavior may be adolescent rebellion (eg, contrast frequency, severity, duration of symptoms)<br>Identify the various roles that teens play regarding violence (eg, perpetrator, victim)<br>Identify that stress may present clinically with vague, generalized somatic complaints |
| Physical | |
| Diagnosis | Be able to:<br>Apply the diagnostic criteria in the differential diagnosis of malingering, somatoform disorders, and conversion disorders in adolescence |
| Management | Be able to :<br>Employ the behavioral techniques that may enhance patient adherence (eg, medicine calendar)<br>Involve parents in adolescent treatment as this is associated with improved adherence<br>Deliver anticipatory guidance relevant to accident prevention for adolescents include drinking and driving, the use of seat belts, non-violent conflict resolutions, and safe firearms handling |

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| | Apply and advise upon the nonviolent strategies for conflict resolution (ie, negotiation and mediation) that are appropriate for adolescents |
| Chronic fatigue syndrome/myalgic encephalitis (CFS/ME) (see ***Neurology***) | |
| Alcohol, drug, tobacco and other substance use and abuse (see ***Substance Abuse***) | |
| Sports participation (see ***Sports Medicine***) | |

| **General management issues**<br>At the end of training a resident should: | |
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| Consent, confidentiality, privacy (eg, legal, special considerations for intellectually challenged patients) | |
| History | Be able to:<br>Take a history respecting the need for privacy for a young person and maintaining confidentiality when appropriate |
| Physical | Be able to:<br>Assess the competence of a young person to make independent decisions about their care |
| Diagnosis | |
| Management | Be able to:<br>Discuss when it is appropriate to share information about a young person with their parents and when it is appropriate to keep that information confidential<br>Discuss with a young person the concept of conditional confidentiality<br>Act appropriately in cases of accidental disclosure or breaking of confidentiality<br>Discuss the legal guidance with regard to the ability of a young person to consent to treatment independently<br>Discuss the legal guidance with regard to the age, or circumstances, in which a young person may refuse |

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| | treatment with or without the consent of their parents<br><br>Discuss consent and confidentiality in respect of young people with learning disabilities in accordance with the local legal guidance<br><br>If it is assessed that the young person does not have the capacity to give consent, act in the best interests of the young person while providing treatment and in releasing confidential information<br><br>Assess when it may be necessary to obtain external advice about legal and confidentiality issues |

## *Gynecology*

| **General**<br>By the end of training, residents should: | |
|---|---|
| History | Be aware of cultural and ethnic variation in communication with patients and families about reproductive health matters<br>Understand normal sexuality, sexual function, and response<br>Be able to:<br>Perform a complete gynecologic history including menstrual, obstetric, sexual, and relevant family and social history<br>Conduct an appropriate private, confidential history when more accurate information about sexual behaviors and/or abuse is needed |
| Physical | Be able to:<br>Perform a complete gynecologic examination including breast, abdomen, pelvis, and rectovaginal examination<br>Perform a pelvic examination, obtain a Papanicolaou smear, and obtain specimens for detection of sexually transmitted diseases<br>Perform routine speculum and bi-manual pelvic exams |
| Diagnosis | Know the indications for a pelvic examination in adolescents<br>Know the gynecologic etiologies of both acute and chronic abdominal pain<br>Be able to:<br>Generate a problem list and formulate differential diagnoses for common gynecological problems<br>Use proper laboratory and diagnostic studies to assess primary and secondary amenorrhea |
| Management | Understand which drugs are teratogenic and contraindicated during pregnancy<br>Be able to: |

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| | Appropriately prescribe oral contraceptive pills for both contraceptive and non-contraceptive purposes<br>Demonstrate awareness of the interactions of oral contraceptives and estrogen replacement regimens with commonly used drugs (eg, antibiotics, anticoagulants, antihypertensives) |

| **Menstruation** | |
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| Normal development and normal menses physiology | |
| History | Understand the hormonal and anatomical changes associated with pubertal development in girls<br>Know that infrequent or irregular menstrual periods within the first two years after menarche do not warrant laboratory investigation under most circumstances<br>Know the normal cycle duration, average blood loss, and duration of normal menstrual flow |
| Physical | |
| Diagnosis | Be able to:<br>Consider pregnancy in differential diagnosis of amenorrhea and vaginal bleeding whether or not there is a history of sexual intercourse |
| Management | Be able to:<br>Initiate management of delayed first menses<br>Counsel adolescents regarding responsible sexual behaviors to prevent unintended pregnancy and sexually transmitted infections (STIs)<br>Counsel girls and their families, on the non-contraceptive advantages of oral contraceptive pills for menstrual problems |
| Menstrual problems | |
| Vaginal discharge | |
| History | Know the characteristics of a normal physiologic discharge<br>Know the common etiologies of vaginal discharge (eg, trichomonas, candida, bacterial vaginosis, and foreign body)<br>Know that most pathologic vaginal discharges of adolescence are generally linked to sexual activity |

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| | Understand the association between candida vaginitis and prior antibiotic use |
| Physical | Be able to:<br>Differentiate between cervicitis and pelvic inflammatory disease through physical examination<br>Perform a vaginal examination including the evaluation of secretions |
| Diagnosis | Know the indications for microscopic and microbiologic analysis of vaginal secretions<br>Be able to:<br>Utilize microscopy and microbiologic cultures in the differential diagnosis of vaginal discharge |
| Management | Be able to:<br>Develop a management plan for a physiologic vaginal discharge<br>Manage uncomplicated pathologic vaginal discharges |
| Menometrorrhagia (eg, dysfunctional uterine bleeding) | |
| History | Understand that abnormal patterns of uterine bleeding<br>Know that menstrual bleeding that persists beyond 10 days is not normal or physiologic<br>Know the most common causes of excessive uterine bleeding<br>Know that dysfunctional uterine bleeding is most commonly associated with anovulatory menstrual cycles<br>Know that the evaluation of dysfunctional uterine bleeding must include the possibility of iron deficiency<br>Know the indications for urgent evaluation and intervention for vaginal bleeding |
| Physical | Be able to:<br>Evaluate vital signs to determine the severity of uterine bleeding |
| Diagnosis | Be able to:<br>Establish a working differential diagnosis for excessive uterine bleeding<br>Order appropriate investigations to establish both the cause, and any complications of, excessive uterine bleeding |

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| | Rule out pregnancy |
| Management | Know when hormonal treatment for dysfunctional uterine bleeding is indicated<br>Know when surgical referral is indicated<br>Be able to:<br>Discuss with patients and families the therapeutic options for treatment of dysfunctional bleeding<br>Manage dysfunctional uterine bleeding with hormones, or refer to a specialist if appropriate<br>Initiate urgent treatment, in consultation with surgeon, when bleeding with signs of physiological instability from blood loss |
| Amenorrhea | |
| History | Know the definitions primary and secondary amenorrhea<br>Know that the etiology of amenorhea may include: pregnancy, hypothalamic or pituitary disorders, eating disorders, excessive exercise, ovarian failure including polycystic ovary syndrome, and obstruction or malformations of the genital tract |
| Physical | Be able to:<br>Identify findings of associated with the common causes of amenorrhea<br>Identify hematocolpos on inspection of the introitus |
| Diagnosis | Be able to:<br>Form a differential diagnosis of primary and secondary amenorrhea<br>Appropriately use laboratory and radiological evaluation to establish a differential diagnosis<br>Rule out pregnancy |
| Management | Be able to:<br>Plan the treatment for secondary amenorrhea in consultation with more experienced colleagues where indicated |
| Dysmenorrhea | |

## *Gynecology*

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| History | Understand the importance of identifying and addressing normal and abnormal menstrual cycles in adolescents<br>Know the pathophysiology of primary dysmenorrhea<br>Be able to:<br>Identify the impact dymennorrhea is having on education and other activities |
| Physical | Understand the importance of undertaking a pelvic examination to rule out secondary causes of dysmennorhea |
| Diagnosis | Be able to:<br>Differentiate between primary and secondary dysmenorrhea<br>Formulate a differential diagnosis in cases of secondary dysmenorrhea |
| Management | Be able to:<br>Advise on the role of exercise, acetaminophen, a healthy diet, and rest in treatment of primary dysmenorrhea<br>Consider the use of prostaglandin inhibitors in the treatment of primary dysmenorrhea<br>Discuss the costs and benefits of the various treatment options for primary dysmenorrhea |

| **Contraception**<br>By the end of training, the resident should: | |
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| History | Understand that many adolescents become sexually active before consulting a physician about birth control<br>Understand the most common reasons that adolescent males and females do not use contraceptives<br>Know that many adolescents are poorly adherent to oral contraception<br>Be able to:<br>Identify features in the history which suggest a young person is sexually active<br>Identify features in the history which may prevent a young person from using contraception effectively<br>Elicit barriers to the use of contraception<br>Detect misconceptions about the use of contraceptives |

## *Gynecology*

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| Physical | Know the importance of measuring blood pressure prior to and during treatment with hormonal contraceptives |
| Diagnosis | |
| Management | Know that pediatricians are likely to see many children who are not yet sexually active and thus have a unique opportunity and responsibility to help prevent consequences of unprotected sexual activity<br>Understand the importance of peer or partner communication and cognitive maturation in adolescents' use of contraception<br>Know that comprehensive reproductive health education programs may reduce early unintended pregnancy rates<br>Understand that relative lack of efficacy of abstinence-only educational programs<br>Know the forms of contraception available to adolescents in the locality<br>Know the relative and absolute contraindications to the use of estrogen-based contraceptives<br>Know the risks and benefits of the use of long acting reversible contraceptives (eg, intra-uterine devices, sub-dermal implants)<br>Know that adherence to a contraceptive method is positively associated with perceived lack of side effects, older age of the user, satisfaction with the selection of the contraceptive method, and desire to avoid pregnancy<br>Be able to:<br>Consider all pertinent factors (eg, social, moral, behavioral) before prescribing contraception for a young person<br>Discuss the benefits and complications of various forms of contraception with young people and their families<br>Counsel young people and their families on the role of estrogen/progesterone post-coital treatment in prevention of pregnancy<br>Describe the differences between medical and surgical abortion services |
| Sex education (see also ***Adolescence***) | |
| History | Be able to: |

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| | Determine the level of understanding of a young person about sexual issues |
| Physical | |
| Diagnosis | |
| Management | Be able to:<br>Ensure that adolescents under their care have access to accurate information, reproductive health services, and contraceptive technologies<br>Demonstrate the importance of addressing HIV and other STI prevention all adolescents, regardless of contraceptive needs or choices<br>Encourage parents to discuss their values and expectations on sexual issues with their offspring as these are important predictors of a young person's choice |

| **Pregnancy (including diagnosis, counseling, medical, emotional, social and economic issues)**<br>By the end of training, the resident should: | |
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| History | Be able to:<br>Detect features in the history which suggest that pregnancy is a possibility<br>Detect social, economic, and educational issues that both predispose to pregnancy and may affect outcome |
| Physical | Be able to:<br>Detect the physical findings of pregnancy |
| Diagnosis | Be able to:<br>Order and interpret investigations to confirm pregnancy and its gestation |
| Management | Be able to:<br>Counsel pregnant adolescents about their pregnancy options<br>Counsel on good prenatal care and the effects this may have on outcomes<br>Counsel on risks and complications of pregnancy |

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| | Refer appropriately for further management |

# *Child Abuse and Neglect*

| **Types of abuse**<br>By the end of training a resident should | |
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| General | |
| History | *Epidemiology/Definitions*<br>Know the WHO definitions of neglect and of physical, emotional, and sexual abuse<br>Know the epidemiology of neglect and abuse in the region<br>Know that sexual abuse is more common in girls than in boys and that the perpetrator is often a family member or a person well known to the family<br>Know characteristics of children at higher risk of neglect and abuse (eg, twins, premature infants, and disabled children)<br>Know family and social characteristics associated with increased risk of abuse (eg, household crowding, poverty, single and/or young parent, poorly educated parent)<br>Know parent psychological characteristics associated with abuse (eg, low self-esteem, low impulse control, mental health problems, history of abuse, substance use)<br>Know that neglectful parents may have these same characteristics, and typically demonstrate difficulty planning and organizing their lives (eg, finding employment, planning major life events)<br>Understand that neglect can be present at all socio-economic and cultural levels<br>Understand that neglect is the most common form of child abuse<br>Know that abusive and neglectful parents often have unrealistic expectations for their children's behavior<br>Know that there is a strong association between intimate partner abuse and child abuse<br>Understand that home escape and repeated accidents may indicate child abuse<br>Understand that low academic performance is a possible indicator of abuse and neglect<br>Understand that toxic ingestions may be manifestations of child abuse<br>Know that abuse is the most common cause of serious intracranial injuries during the first year after birth |

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| | Know the other physical, psychological or maturational problems leading to soiling and wetting<br>Be aware of apneic episodes in infants as a possible presentation of imposed airway obstruction<br><br>*Interview*<br>Understand that a skilled interview of a verbal child is invaluable in determining abuse, and that obtaining the history may require referral to a specialist experienced in child abuse evaluation<br>Know that sexual abuse may present with other symptoms such as constipation, abdominal pain, recurrent urinary tract infections, or behavioral problems<br>Know that anorexia and bulimia may indicate abuse or neglect<br>Know that shaking of a child is a common cause of coma and seizures in the absence of signs of cutaneous trauma<br>Be able to:<br>Identify features in the history that raise suspicions that the presenting symptoms are due to abuse or neglect |
| Physical | Understand that fractures are present in a minority of physically abused children<br>Know that fractures of ribs, scapulae, and sternum are rarely accidental<br>Know the most common fracture locations and types in physically abused children<br>Know about acute and chronic presentations of subdural hemorrhage<br>Know that retinal hemorrhages may be difficult to detect<br>Know that the chip fracture of metaphysis is commonly due to wrenching or pulling injuries<br>Understand the life-threatening nature of imposed airway obstruction<br>Know that inappropriate sexualized behavior may be a sign of sexual abuse<br>Be able to:<br>Identify the general signs of abuse: |

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| | - Injuries incompatible with the age or the level of psychomotor child development<br>- Injuries not compatible with a reported accident<br>- Injuries in many parts of the body, bilateral<br>- Injuries in anatomic regions of body usually covered, like lateral areas, dorsal region, neck, thigh or genitalia<br>- Injuries at different stages of healing<br>- Physical signs of multiple accidents<br>- Unjustifiable delay between the supposed accident and medical examination of the victim, scheduled by a parent<br>Recognize injuries in children that are infrequently indicative of physical abuse (eg, dislocated elbow, clavicular fracture, toddler fracture of the tibia)<br>Distinguish between an inflicted burn and skin conditions that mimic burns (eg, staphylococcal impetigo, herpes, contact dermatitis, and toxic epidermal necrolysis)<br>Distinguish between inflicted fractures and conditions such as osteogenesis imperfecta, hypophosphatasia, infantile cortical hyperostosis, and osteoid osteoma<br>Recognize the need for a retinal examination to identify retinal hemorrhage in suspected head trauma due to shaking<br>Perform fundoscopy and recognize retinal hemorrhage |
| Diagnosis | Understand the difficulties in diagnosing the intensity of emotional abuse<br>Understand the role of a bone survey for fractures in suspected child abuse<br>Know that a radionuclide bone scan can reveal subtle areas of skeletal trauma that may not be seen on plain film x-ray studies of bones<br>Know that a detailed history of the events must correlate with developmental stage of the child, and is often required to make the diagnosis of abuse |

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| | Be able to:<br>Obtain a skeletal survey in a child with a subdural hematoma<br>Utilize the appropriate investigations and involvement of other disciplines (eg, ophthalmology, radiology)<br>Differentiate intentional neglect from deprivation associated with poverty<br>Distinguish between cutaneous signs of physical abuse and accidental injury<br>Distinguish between the physical findings of inflicted and accidental burns<br>Distinguish between cutaneous signs of physical abuse and of nonabusive skin conditions (eg, Mongolian spot, coining, cupping, urticaria pigmentosa)<br>Recognize that a delay by parents or caretakers in seeking medical care for a child's physical injury should raise the suspicion of child abuse/neglect |
| Management | *Treatment*<br>Be aware of intervention options for families involved in child abuse<br>Understand the problems associated with foster home placement (including the continued risk of child abuse)<br>Know that many abused and neglected children are not removed from their parents or placed in foster care<br>Know that parenting classes for high-risk parents have been shown to decrease the incidence of abuse<br>Be able to:<br>Provide the first medical care for abused children and adolescent in order to mitigate immediately the identified injuries<br>Refer to appropriate specialist<br><br>*Documentation*<br>Understand the need for a complete documentation concerning the procedures that are made to identify the abuse or neglect, in accordance to local and/or national law<br>Know the circumstances that can lead to failure to substantiate child abuse (eg, failure to locate child or parents, |

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| | parents' refusal to cooperate, duplicate reports, non-native language speaking family)<br><br>Know the local/state/national requirements for reporting sexual abuse to law enforcement and/or child protection services<br><br>Know your legal obligations for reporting suspected abuse<br><br>Understand that an investigation of unsubstantiated cases of child abuse produces stress in a family<br><br>Understand that an unsubstantiated report/finding by a child protection agency does not necessarily mean that abuse or neglect did not occur<br><br>Be able to:<br><br>Document and transmit a detailed report about the abuse or neglect suffered by a child or adolescent to the appropriate authority<br><br><br><br>*Multi-disciplinary team work*<br><br>Understand the need for a team approach in the management of child abuse<br><br>Be aware of intervention options for families involved in child abuse<br><br>Be able to:<br><br>Refer to an ophthalmologist when there is suspicion of non-accidental head injury<br><br>Participate in a multidisciplinary team, contributing to joining their multiple roles for protecting children and adolescent rights |
| **Factitious disorder by proxy**<br>At the end of training a resident should: | |
| History | Know the pathways to gather medical, educational and social information on the child |
| Physical | Be able to:<br><br>Recognize the signs of factitious disorder by proxy (eg, recurrent sepsis from injecting fluids, chronic diarrhea from laxatives, false renal stones from pebbles, fever from heating thermometer, rashes from trauma, sugar |

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| | or blood in the urine) |
| Diagnosis | Be able to:<br>Recognize the features of the parent of a child with factitious disorder by proxy<br>Recognize that children with factitious disorder by proxy may exhibit significant ongoing psychological problems<br>Recognize pointers to fabricated and induced illnesses<br>Recognize this as an expression of distress, acute or long-term |
| Management | Know the components of a management plan for a patient with factitious disorder by proxy<br>Know how to seek help for those suspected of fabricated and induced illnesses<br>Be able to:<br>Refer to the appropriate psychiatry or psychology services |

## *Substance Abuse*

| **Epidemiology and risk factors**<br>By the end of training, the resident should: | |
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| | Know that the substance abuse has significant health consequences for individuals and society |
| | Know that use/abuse of multiple drugs is often more common than the use/abuse of a single drug |
| | Understand the general trends in use and abuse for alcohol, cannabis, tobacco, and other drugs among children, adolescents, and young adults |
| | Know where to find information about country-level substance use and abuse |
| | Know the genetic factors that predispose to tobacco use/addiction, problem drinking, and alcohol abuse |
| | Understand that familial issues (eg, parental drug use/abuse, child abuse, family disruption, and family tolerance of alcohol, tobacco or drug use) are associated with higher rates of adolescent substance abuse |
| | Understand that substance use among close peers is a strong predictor of substance use/abuse in adolescents |
| | Understand that early academic failure predisposes to adolescent behavioral dysfunction, including substance use/abuse |
| | Understand that feelings of connectedness to school, family, and community are protective factors against substance use/abuse in youth |
| | Understand that parental monitoring and expectations are protective against substance use/abuse in youth |

| **General**<br>By the end of training, the resident should: | |
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| History | Understand the requisites for privacy and confidentiality in eliciting a substance history from children and adolescents |
| | Understand the association of substance use/abuse and drug trafficking among children in extreme poverty, as well as homeless and runaway youths |
| | Understand the potential value of information gathered from school, runaway/homeless shelters, or police |

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| | authorities in evaluating substance use/abuse<br>Understand that drugs are often adulterated and that an overdose may be secondary to either a combination of drugs or a drug other than the one alleged to have been taken by an overdose victim<br>Know that substance use/abuse is associated with a wide range of adolescent dysfunction (eg, delinquency, school failure, promiscuity, running away from home, family conflict, depression, suicide attempts)<br>Understand the concepts of tolerance of , dependence on and withdrawal from, addictive drugs<br>Know that chronic abuse of 'hard drugs' is associated with physical neglect and malnutrition<br>Be able to:<br>Elicit which substances are being used/abused, frequency, circumstances of use, and associated risk factors<br>Elicit any psychiatric symptoms are common among adolescents with substance abuse disorders<br>Obtain information from parents about their own substance use/abuse and any concerns about their child's substance use/abuse<br>Obtain a comprehensive sexual history and HIV screening among youth involved in drug trafficking and/or street/runaway cultures |
| Physical | Be able to:<br>Identify signs of intravenous drug abuse<br>Identify signs of toxic overdose of alcohol and illegal drugs |
| Diagnosis | Be able to:<br>Use toxicology screening results to identify substances used/abused |
| Management | Understand the potential role of the pediatrician in coordinating management of substance abuse treatment in youths across service systems (eg, school, mental health or shelter facilities, drug and alcohol treatment centers)<br>Understand the role of the pediatrician in counseling youth and parents about the dangers of tobacco/alcohol use/abuse and other substance abuse<br>Understand the role of the pediatrician in substance use/abuse education within the schools and general community |

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| | Know the potential advantages of community-based initiatives designed to decrease access and use of alcohol, tobacco, and other substances<br><br>Understand principles of brief motivational interviewing and other counseling techniques to promote healthy behavior change and prevent substance use/abuse<br><br>Understand the relationship between the pediatrician and the specialist in managing children and adolescents with substance abuse<br><br>Know that the potential for relapse is lifelong for those who use/ abuse drugs/alcohol and tobacco<br><br>Be able to:<br><br>Counsel families about the methods to minimize the dangers of substance use/abuse (eg, abstinence, avoidance of drinking and driving, avoid peer groups with drug usage, appropriate parental support)<br><br>Counsel young people and their parents about alternatives to help break addition (eg, nicotine gum, nicotine patches, low alcoholic beverages)<br><br>Prepare an adolescent and their family for referral for substance use/abuse treatment<br><br>Periodically reassess the progress of a patient referred for substance use/abuse treatment |

| **Specific substances and complications**<br>By the end of training, the resident should: | |
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| Alcohol | |
| History | Know the major physiologic consequences attributable to alcohol use/abuse, including the potential for physiologic addiction<br><br>Know the major behavioral consequences of alcohol use/abuse<br><br>Understand the potential influence of parental drug/alcohol use/abuse patterns on their child's behavior<br><br>Be able to:<br><br>Elicit an accurate disclosure of alcohol use by providing an opportunity for confidential discussion between the pediatrician and patient |

## *Substance Abuse*

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| Physical | Be able to:<br>Identify the signs of an acute alcohol overdose |
| Diagnosis | Be able to:<br>Formulate the differential diagnosis of acute alcohol overdose versus other ingestions |
| Management | Be able to:<br>Plan the management of acute alcohol overdose<br>Provide in collaboration with specialists as appropriate supervision of withdrawal<br>Liaise with dietician in provision of nutritional assessment in management of chronic alcohol abuse |
| Cannabis (marijuana, hashish) | |
| History | Know that many adolescents may use cannabis alone<br>Know the major physiologic consequences attributable to cannabis use/abuse<br>Know the major behavioral consequences of cannabis use/abuse<br>Know that most individuals do not progress to more seriously addictive drugs<br>Know that that cannabis dependence can occur<br>Understand that cannabis may be contaminated with herbicides or adulterated with other drugs of abuse and that these may lead to poisoning or other ingestion symptoms<br>Be able to:<br>Elicit an accurate disclosure of cannabis use by providing an opportunity for confidential discussion between the pediatrician and patient |
| Physical | Be able to:<br>Recognize the signs of cannabis ingestion/use |
| Diagnosis | Know the diagnostic criteria for cannabis dependence |

## *Substance Abuse*

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| Management | Know that treatment options are predominantly psychotherapeutic<br>Be able to:<br>Utilize criteria for referral for dependency |
| Tobacco | |
| History | Know the major physiologic and chronic illness consequences attributable to smoking and chewing tobacco<br>Know about alternative tobacco products<br>Know the major behavioral consequences of tobacco use/abuse, including the known risk of physiologic addiction<br>Know the risks due to secondhand smoke exposure and that desire to protect others is a strong factor in motivation to change smoking behaviors<br>Understand the pattern of occasional use and addiction to tobacco demonstrated by youth<br>Understand that nicotine exposure generate nicotine receptors and remodels brain pathways, and that adolescent are more susceptible than adults to these drug effects<br>Understand that some patients who report to be non-smokers may be using other nicotine-containing products<br>Understand the role of inflammatory changes from smoke and secondhand smoke in respiratory diseases and in cardiovascular disease risk<br>Be able to:<br>Elicit an accurate disclosure of tobacco use by providing an opportunity for confidential discussion between the pediatrician and patient |
| Physical | Be able to:<br>Identify signs of chronic tobacco use (eg, nicotine staining, smell of tobacco on clothes) |
| Diagnosis | |
| Management | Know the role that pharmacologic and non-pharmacologic treatment may play in tobacco cessation<br>Understand the importance of policy interventions and media imagery in prevention youth addiction to tobacco |

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| | Be able to:<br>Recommend that there is no safe 'experimental' smoking<br>Provide referral and adjuncts to support cessation in treating nicotine addiction<br>Approach tobacco cessation as a chronic health problem with follow-up and reinforcement needed to achieve behavioral management and abstinence goals |
| Opiates | |
| History | Know the major physiologic consequence attributable to the use of opiates<br>Know the major behavioral consequences of opiate use/abuse<br>Know the potential for physiologic addiction<br>Know the methods of opiate administration<br>Know the associations of intravenous use with blood borne infections (eg ,Hepatitis B, Human Immunodeficiency Virus)<br>Be able to:<br>Elicit an accurate disclosure of opiate use by providing an opportunity for confidential discussion between the pediatrician and patient<br>Identify symptoms of acute intoxication<br>identify psychological and physical dependency and withdrawal symptoms from chronic use |
| Physical | Be able to:<br>Identify the signs of an acute opiate overdose |
| Diagnosis | Be able to:<br>Formulate the differential diagnosis of acute opiate overdose versus other ingestions or alterations in mental status |
| Management | Be able to: |

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| | Plan for the management of an acute opiate overdose<br>Provide close monitoring and management of opiate withdrawal<br>Refer for treatment after acute detoxification |
| Amphetamines, Hallucinogens, Cocaine | |
| History | Know the major physiologic consequences attributable to amphetamines, hallucinogens, cocaine<br>Know the possible methods of administration (ie, oral, intravenous, smoking)<br>Know the major behavioral consequences of amphetamines, hallucinogens, cocaine use/abuse<br>Know the potential for physiologic addiction<br>Know that chronic use can precipitate psychotic episodes<br>Understand that stimulant prescriptions are a common source of available amphetamines for youth<br>Be able to:<br>Elicit an accurate disclosure of amphetamines, hallucinogens, and cocaine use by providing an opportunity for confidential discussion between the pediatrician and patient<br>Identify symptoms of acute intoxication<br>Identify psychological and physical dependency and withdrawal symptoms from chronic use |
| Physical | Be able to:<br>Identify the signs of an acute intoxication |
| Diagnosis | Be able to:<br>Formulate the differential diagnosis of single drug overdose versus other ingestions or alterations in mental status |
| Management | Be able to:<br>Plan for the management of an acute overdose<br>Refer for further management as appropriate |

## *Substance Abuse*

| Inhalants | |
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| History | Know the physiologic consequences of the use/abuse of inhalants<br>Know the variety of agents used as inhalants (eg, organic solvents, fuels, toluene, paint thinner, glues, spray paint, gasoline, Freon, propane)<br>Know that cardiac dysrhythmias are the major cause of death from inhalant overdose<br>Be able to:<br>Elicit an accurate disclosure of inhalant use by providing an opportunity for confidential discussion between the pediatrician and patient |
| Physical | Be able to:<br>Identify the signs and symptoms of an acute inhalant overdose |
| Diagnosis | Be able to:<br>Formulate the differential diagnosis of acute inhalant overdose versus other ingestions or alterations in mental status |
| Management | Be able to:<br>Plan for the management of an acute inhalant overdose |
| Anabolic steroids | |
| History | Know the activities that are risk factors for use/abuse of performance enhancing drugs<br>Know the physiologic consequences of the use/abuse of anabolic steroids and other performance enhancing drugs<br>Know the major behavioral consequences of the use/abuse of anabolic steroids<br>Be able to:<br>Elicit an accurate disclosure of inhalant use by providing an opportunity for confidential discussion between the pediatrician and patient |
| Physical | Be able to:<br>Identify the signs of anabolic steroids and other performance enhancing drug use |

## *Substance Abuse*

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| Diagnosis | Be able to:<br>Formulate the differential diagnosis and potential complications of anabolic steroids and other performance enhancing drug use |
| Management | Be able to:<br>Plan for the management of anabolic steroid and other performance enhancing drug use |
| Over-the-counter medicines (OTC) and alternative/herbal products | |
| History | Know the risk of abuse of OTC cough and cold preparations (eg, pseudoephedrine, dextromethorphan) and of alternative and herbal products<br>Be able to:<br>Elicit an accurate disclosure of use of over the counter medicines by providing an opportunity for confidential discussion between the pediatrician and patient |
| Physical | Be able to:<br>Identify the signs of chronic use or abuse of OTC preparations and alternative and herbal product use and overdose |
| Diagnosis | Be able to:<br>Formulate the differential diagnosis of chronic use or abuse of OTC preparations, and alternative/herbal products versus other ingestions or alterations in physical or mental status |
| Management | Counsel about risks associated with chronic use of OTC and alternative herbal products |

# *Community Pediatrics*

NOTE to the Learner: Community Pediatrics denotes a place of practice rather than a scope of practice. Scope of practice is highly variable according to the healthcare delivery systems in a country or region. However, with the exception of aspects of delivery of acute and emergency care almost, most of the Global Curriculum is relevant to those in community practice; for example, there is a strong emphasis in all of the specialty chapters about the provision of long term condition care in the community in collaboration with education and social care.

Some areas of the Global Curriculum are almost exclusively delivered in the community for example, Adolescent Medicine, Behavioral and Mental Disorders, Child Abuse and Neglect, Preventative Pediatrics, Psychosocial Functioning, Language and Learning Disorders, and Rehabilitation.

All the learning objectives in Chapter 1 dealing with Ethics in Practice; Collaboration; Global Health Awareness; Patient Safety and Quality Improvement; Research Principles and Evidence-based Practice; Scholarly Activity; Self-Leadership and Practice Management; Communication and Interpersonal Skills; Health Advocacy and Children's Rights; and Professionalism are relevant to all pediatricians regardless of the setting in which they practice.

Therefore, the following learning objectives are not intended to be a comprehensive set of community pediatric learning objectives. The intention is to offer the learner a 'flavor' of the scope of practice of the pediatrician working in the community signposting to the other areas of the Global Curriculum where these learning objectives are detailed.

| **Health Care systems**<br>By the end of training, the resident should: | |
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| | Understand a health care systems approach and the variation in systems that exist across and between countries |
| | Understand that access to health services requires both capacity and utilization |
| | Understand that continuous quality improvement requires analysis of care process and outcome measures and planned changes with measurement of results |
| | Understand the importance of collaboration between public health and clinical care systems |
| | Understand the importance of collaboration during early childhood education between schools and clinical care |

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| | systems<br>Understand the role of school health services within comprehensive school health programs<br>Understand the importance of a primary care patient centered medical home in meeting child and adolescent needs for all children<br>Understand the importance of team care delivery to address specific health care problems of children with special health care needs<br>Understand the role of support programs for families and children with special health care needs<br>Understand how to identify and mobilize community assets and resources toward preventing illness, injury, and related morbidity and mortality<br>Understand the legislative and policy process in the governmental jurisdiction in order to address community and child health issues<br>Be able to:<br>Identify and/or provide a medical home for all children and families, consisting of well-trained physicians who provide accessible, continuous, comprehensive, family-centered, coordinated medical care<br>Identify youth at risk for poor health outcomes and those with special health care needs<br>Demonstrate an ability to collaboratively develop and implement management plans that are realistic, family-centered, community-referenced, nonrestrictive, and effective<br>Demonstrate a working knowledge of psychosocial issues, legal protections/implications, policies, and services provided at the local, state, and national levels<br>Demonstrate the ability to act as a child health consultant in the community, and be able to work with schools, child care facilities, and others<br>Demonstrate advocacy skills to address relevant individual, community, and population health issues |
| Adolescence | |
| | Self care, chronic illness and transition, eating disorders, behavioral health issues |

## *Community Pediatrics*

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| Behavioral and Mental Health | |
| | Colic, feeding problems, crying, sleeping problems, rocking movements, toilet training, thumb sucking, biting, masturbation, temper tantrums, breath holding, head banging, fears and phobias, school refusal, lying and stealing, sleep problems, aggressive, disruptive and anti-social behaviors, phobias, obsessive compulsive disorder, post traumatic stress disorder, reactive attachment disorders, mood and affect disorders, somatoform disorders, suicide, self injury, enuresis, Attention Deficit Hyperactivity Disorder (ADHD) |
| Child Abuse and neglect | |
| | Types of child abuse, factitious disorder by proxy |
| Gastroenterology and Hepatology | |
| | Encopresis |
| Growth and development | |
| | Normal growth and development, development milestones |
| Gynecology | |
| | Contraception, Sex education |
| Nutrition | |
| | Infant feeding, deficiency states, nutritional support, nutrition and chronic illness, obesity |
| Palliative Care | |
| | Symptom control, multi-disciplinary team working, legal and ethical issues |
| Preventative Pediatrics | |
| | Immunization, Health Promotion, Screening |
| Psychosocial | |
| | Family and environmental issues, chronic illness, and handicapping conditions |
| Rehabilitation | |

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| | General rehabilitation, neurologic, and musculoskeletal problems |
| Rheumatology | |
| | Chronic Pain syndrome |
| Sports Medicine | |
| | Exercise and Population health |
| Substance Abuse | |
| | General, alcohol, and tobacco |
| Toxicology and Poisoning | |
| | General, specific substances, environmental toxins |

## *Preventive Pediatrics*

| **General Public Health**<br>By the end of training, the resident should : | |
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| Management | Understand available measures used to monitor the health of a child population and how they might be implemented to guide and monitor service delivery<br><br>Know the indices of social deprivation<br><br>Understand the principles of public health needs assessment<br><br>Understand the role of public health physicians in commissioning services<br><br>Understand the principles of epidemiology and the findings of population studies<br><br>Understand the effect of the media on public perception of health care issues<br><br>Understand the effect of non-health policies on child health<br><br>Understand child health exploitation issues including child prostitution, child labor, and children in combat areas<br><br>Understand the concepts and factors underpinning child protection work<br><br>Understand the effects of armed conflict on child health<br><br>Understand the implications of sustainable development in low income countries<br><br>Know the resources that may be available from health agencies, including the voluntary sector and allied health professionals<br><br>Understand the principles and practice of common legal processes and legislation relating to safeguarding all children including the most vulnerable<br><br>Be able to:<br><br>Identify the key determinants of child health and well being<br><br>Counsel families to find help with the management of children in need of protection and the pathways to ensure follow-up<br><br>Explain the effects of family composition, socio-economic factors, and poverty on child health<br><br>Explain the local, national, and international structures of healthcare |

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| | Evaluate population statistics and know how they might be used in service development<br>Explain how healthcare relates to education and social services |
| Health Promotion | |
| Management | Understand the principles of health promotion<br>Understand the evidence to support health promotion activities<br>Be able to:<br>Actively participate in health promotion programs<br>Advise parents of avoiding risks for children<br>Consult appropriately with specialists to assist in health promotion interventions (eg, dentists, addiction counselors)<br>Incorporate health promotion activities into daily practice (eg, prevention of tooth decay, smoking cessation, accident avoidance, obesity prevention) |

| **Immunizations** | |
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| **General**<br>By the end of training, the resident should: | |
| History | Understand the cultural and social issues that influence parents choice about accepting immunization of their child<br>Be aware that reactions to vaccines may be due to faulty administration as well as reaction to the constitiuents<br>Be able to:<br>Obtain a full immunization history<br>Identify any risk factors for immunization<br>Obtain a detailed history of any previous reactions to vaccines in the child or family member |
| Physical | Be able to:<br>Detect local reactions to vaccines |

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| | Identify the features of anaphylaxis |
| Diagnosis | Be able to:<br>Differentiate between a co-incidental 'reactions' (ie, those that would have happened anyway and are not due to vaccine) to a vaccine and an adverse reaction |
| Management | Understand the objectives of immunizations<br>Understand the immune system and how vaccines work<br>Understand and differentiate between active and passive immunity<br>Know the vaccine preventable diseases<br>Be aware of local/national policy and schedules<br>Know the different types of vaccines used and their composition<br>Be aware of current issues and controversies regarding immunization<br>Understand that not all egg-based vaccines are contraindicated for children after an anaphylactic reaction to eggs<br>Know that patients with a history of anaphylactic reaction to eggs should generally not receive inactivated influenza vaccine<br>Know the legal aspects of vaccination<br>Know the various administration routes of all vaccines<br>Be able to:<br>Identify children with special vaccination requirements. For example:<br>- A patient born prematurely<br>- children or adolescents who begin their immunizations late or whose immunizations are delayed<br>- immune deficient patients and their contacts<br>- patients with a history of anaphylaxis to egg<br>Administer measles vaccine to a patient with egg allergy when it is appropriate |

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| | Advise on vaccines for travel directing families to the various resources which offer vaccine recommendations for individuals as appropriate<br>Advise families on contraindications, absolute and relative<br>Demonstrate good record keeping of both administration and reporting of adverse reactions<br>Store and handle of vaccines correctly<br>Manage anaphylaxis and other adverse events<br>Collaborate with others to develop strategies for improving immunization rates<br>Identify missed opportunities and false contra-indications |
| **Specific immunizations**<br>By the end of training, the resident should: | |
| Influenza vaccine | |
| Management | Know that the influenza vaccine should be administered yearly to children with certain chronic diseases (eg, asthma, congenital heart disease, cystic fibrosis, BPD), and to immune-suppressed patients after transplant<br>Know that Influenza vaccine contains antigens for influenza A and B and that the constituency may change annually<br>Know the safety of the inactivated influenza vaccine (eg, lack of significant neurologic complications, non-communicable)<br>Know the safety use and contraindications for live attenuated influenza vaccine |
| Meningococcal vaccine | |
| Management | Know which serotypes are contained in the meningococcal vaccine |
| Pneumococcal vaccine | |
| Management | Know that pneumococcal vaccines are either conjugated or non-conjugated and that each is multivalent<br>Know that the immunogenicity of the polysaccharide pneumococcal vaccine is limited in children younger than 24 months of age<br>Know the benefits for the use of the pneumococcal conjugate vaccine (ie, primarily the prevention of pneumococcal pneumonia and pneumococcal meningitis, less effective in prevention of otitis media) |

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| | Understand that the pneumococcal conjugate vaccine is protective only against the serotypes included in the vaccine |
| Hepatitis vaccines | |
| Management | Know which newborn infants are at greatest risk for infection with hepatitis B and the potential consequences of such infection<br>Know that the hepatitis B vaccine is composed of recombinant DNA-produced HBsAg<br>Know the recommended use of hepatitis B vaccine in premature infants<br>Be able to:<br>Manage the hepatitis B vaccine schedule in an infant born to a hepatitis B infected mother |
| Tetanus vaccine | |
| Management | Know that the tetanus vaccine is a toxoid<br>Know that permanent immunity does not result from C. tetani infections treated with antitoxin<br>Know the adverse effects of excessive tetanus immunization |
| Diphtheria-tetanus combination | |
| Management | Know the difference between DT and dT<br>Know the appropriate ages for the use of DT and dT |
| Pertussis vaccines (cellular and acellular) | |
| Management | Know the composition of pertussis vaccines<br>Know the efficacy and possible complications of pertussis vaccines<br>Know the contraindications of pertussis vaccines (eg, unstable or active CNS disease, immediate anaphylaxis, encephalopathy within seven days)<br>Know in which conditions use of the pertussis vaccine is not contraindicated (eg, stable CNS disease, family history of seizures, SIDS in a sibling, low-grade fever) |
| DTaP and Tdap vaccines | |

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| Management | Know that administering decreased volumes of the DTaP vaccine because of prior reactions is inappropriate<br>Know the difference between DTaP and Tdap vaccines<br>Know the appropriate circumstances for the use of Tdap and DTap vaccines |
| Measles vaccine | |
| Management | Know the appropriate use of the measles vaccine during an outbreak<br>Know that infants who were immunized for measles when younger than 12 months of age may not be protected<br>Know the contraindications of the (live virus) measles vaccine<br>Know the recommendations regarding measles revaccination<br>Understand the importance of the second dose of measles vaccine |
| Mumps vaccine | |
| Management | Know the immunization schedule for the mumps vaccine<br>Know the contraindications of the live virus mumps vaccine<br>Know the recommendations regarding re-vaccination with the mumps vaccine<br>Know the importance of the second dose of the mumps vaccine |
| Rubella vaccine | |
| Management | Know that while the rubella vaccine is not recommended for use in pregnant women, there has never been a reported case of congenital rubella syndrome caused by the vaccine virus |
| Poliovirus vaccine | |
| Management | Know the efficacy of the poliovirus vaccine<br>Know the safety of the poliovirus vaccine<br>Understand that oral poliovirus vaccine is transmissible by the fecal-oral route and may provide herd immunity<br>Know the importance of asking the parents whether everyone in the home has been immunized against poliovirus |
| Hemophilus influenza type b vaccine | |
| Management | Know the composition and use of the H. influenzae type b vaccines |

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| | Recognize the changes of epidemiology of H. influenzae infection secondary to widespread use of the vaccine |
| Varicella vaccine | |
| Management | Know the indications for the use of varicella vaccine after exposure |
| Human papillomavirus (HPV) | |
| Management | Know the efficacy and safety of the HPV vaccine<br>Know that the HPV vaccine has indications for use in males and females<br>Understand that only one of the two HPV vaccines is approved for use in males<br>Be able to:<br>Plan a vaccine schedule for administering HPV vaccine |
| Rotavirus | |
| Management | Know the efficacy and safety of the Rotavirus vaccine<br>Understand that the Rotavirus vaccine is a live, attenuated vaccine<br>Understand that there are two Rotavirus vaccines in use, each with different dosing schedule<br>Be able to:<br>Plan a vaccine schedule for administering Rotavirus vaccine |
| Recombinant Calmette-Guerin bacillus [BCG]) | |
| Management | Know the efficacy and use of BCG vaccine throughout the world<br>Understand that BCG is a live vaccine<br>Be able to:<br>Plan the use of BCG in HIV patients |

| **Other disease prevention measures**<br>By the end of training, the resident should : |
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| Dental Protection (Fluoride) |

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| Management | Know the indications for fluoride supplementation in children<br>Understand the dosing schedule for supplemental fluoride administration<br>Be able to:<br>Identify and consult for patients receiving excess fluoride |
| Skin Protection (sunscreen products) | |
| Management | Understand the different sunscreen products and know those indicated specifically for children<br>Understand the need to apply sunscreens prior to sun exposure and the need to repeat applications every two hours<br>Be able to<br>Counsel parents regarding sunscreens and exposure to sun |
| Protection against insect bites | |
| Management | Know the various insect repellent products and be able to counsel parents/children on their use<br>Be able to:<br>Counsel parents/children on the use and complications of use of insect repellants<br>Advise a parent on the appropriate method to remove insects from their child (eg, ticks)<br>Counsel parents regarding the prevention of animal bites |
| Heart disease prevention (Tobacco, see ***Substance Abuse***; Obesity, see ***Nutrition***; Hyperlipidemia, see ***Metabolism***) | |
| Management | Understand the risk factors associated with development of heart disease (eg, family history, hyperlipidemia, smoking, obesity)<br>Be able to:<br>Set up a treatment plan for children at risk for heart disease |
| Osteoporosis ( Tobacco, see ***Substance Abuse;*** Obesity, see ***Nutrition***) | |
| Management | Be able to:<br>Counsel families regarding the effects of diet, exercise, and smoking on the natural history of osteoporosis |

## *Preventive Pediatrics*

| Respiratory disease (eg, second-hand smoke and tobacco use) (Tobacco see also ***Substance Abuse***) | |
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| History | Know that passive exposure to cigarette smoke in the home increases the chances, frequency, and duration of lower respiratory tract illness in children<br>Know that common indoor exposures can produce respiratory symptoms (eg, wood fires and stoves, cooking spray, hair spray, animal dander, cigarette smoke) |
| Chemoprophylaxis for infection (eg, HIV, TB, Malaria) (see ***Infectious Diseases***) | |
| Prevention of transmission of infection (eg mother to child transmission of HIV, hygiene measures) (see ***Infectious Diseases***) | |

| **Anticipatory guidance**<br>By the end of training, the resident should: | |
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| General injury and safety (eg, automobiles, stairways, bicycles) | |
| History | Know the common causes of household injury<br>Understand the influence of age on the different types of injury<br>Be able to:<br>Provide anticipative guidance based upon regional/local risks and exposures |
| Physical | Be able to:<br>Perform a physical exam evaluating for signs of injury/trauma |
| Diagnosis | Be able to:<br>Differentiate between accidental and intentional trauma/injury |
| Management | Know that drunk driving is a major cause of automotive fatalities among young drivers<br>Be aware of the significance of non-crash automobile accidents for young children<br>Know the dangers of infant walkers and stairs<br>Be able to:<br>Recommend appropriate car restraint systems based on age and weight of the infant or child |

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| | Provide age-appropriate home safety information<br>Recommend ways to prevent head injury<br>Counsel parents regarding bicycle safety<br>Counsel parents and children regarding the use of safety equipment with recreational equipment |
| Burns | |
| Management | Be able to:<br>Counsel parents regarding prevention of burns (eg, matches, electrical burns, fireworks)<br>Counsel parents regarding safe settings for hot water heaters |
| Water safety | |
| Management | Know the facts about drowning deaths (eg, epidemiology, location)<br>Be able to:<br>Counsel families regarding safe boat use (eg, flotation devices, supervision)<br>Counsel families about safe pool practices |
| Firearms | |
| Management | Know the epidemiology of firearms in households in your country<br>Be able to:<br>Counsel parents regarding the risks of having firearms in the home<br>Identify components of an injury prevention for firearms in a household (eg, safe storage, unloaded firearms, discarded ammunition, child safety training) |
| Personal safety (eg, strangers) | |
| Management | Be able to:<br>Counsel parents regarding how to instruct their children from potentially harmful situations |
| Sleep (eg, SIDS, obstructive sleep apnea, normal patterns) | |
| Management | Understand and counsel parents regarding risk factors which can increase the risk of SIDS |

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| | Be able to:<br>Counsel parents regarding bedtime routines for infants/children and adolescents<br>Instruct parents regarding recommended sleep positions in infants<br>Arrange referral to a specialist if there is clinical suspicion of obstructive sleep apnea |
| Child care/day care | |
| Management | Be able to:<br>Counsel parents regarding the benefits/risks associates with child care<br>Counsel parents increased exposure to communicable diseases associated with daycare attendance |
| School readiness | |
| Management | Be able to:<br>Counsel parents regarding indicators of school readiness in their children |
| "Screen" time (eg, TV, computer) (see ***Psychosocial Functioning***) | |
| Substance abuse (see ***Substance Abuse***) | |
| Poison prevention (see ***Toxicology and Poisoning***) | |
| Obesity Issues (eg, exercise, physical activity, nutrition, food/feeding behavior) (see ***Nutrition*** and ***Endocrinology***) | |
| Behavior/discipline (see ***Psychosocial Functioning***) | |

| **Screening**<br>By the end of training, the resident should: |
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| General |
| Know which children's growth and development surveillance programs operate in the local area<br>Know which neonatal screening programs operate in the area (eg metabolic, hearing and vision)<br>Understanding the principles of establishing a screening program( eg cost effectiveness, efficacy, deliverability)<br>Understand the difference between opportunistic, targeted and population screening<br>Understand the ethical dilemmas posted by screening |

## *Preventive Pediatrics*

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| | Be able to:<br>Evaluate and implement screening and surveillance programs<br>Explain specific screening results to parents and organize the appropriate follow up investigations |
| Growth (see ***Growth and Development***) | |
| Inborn errors of Metabolism (see ***Metabolism***) | |
| Hearing (see ***Otolaryngology***) | |
| Vision (see ***Ophthalmology*****)** | |
| Blood pressure (see ***Cardiology: Hypertension*** and ***Nephrology***) | |
| Hypercholesterolemia(see ***Metabolism*****)** | |
| Lead (see ***Toxicology and Poisoning Emergencies***) | |