The University of Arizona Pediatric Residency Program

Primary Goals for Rotation

Infectious Diseases

1. **GOAL:** Immunodeficiency. Understand the role of the general pediatrician in the assessment and management of patients with immunodeficiency.
2. **GOAL:** Understand the role of the pediatrician in preventing infectious diseases, and in counseling and screening individuals at risk for these diseases.
3. **GOAL:** Differentiate between normal and pathologic states related to infectious disease.
4. **GOAL:** Evaluate, treat, and/or refer patients with presenting signs and symptoms that may indicate an infectious disease process.
5. **GOAL:** Diagnose and manage infectious disease conditions that do not require referral.
6. **GOAL:** Recognize and initiate therapy in patients with infectious disease conditions that require consultation or referral.
7. **GOAL:** Human Immunodeficiency Virus (HIV). Recognize, screen for, refer and co-manage patients with HIV.
8. **GOAL:** Use of Antibiotics. Use antibiotics appropriately in managing infections in children.
9. **GOAL:** Immunizations. Use vaccines to prevent common childhood diseases.
10. **GOAL:** Infection Control. Understand principles of infection control in pediatric care settings.
11. **GOAL:** Understand the laboratory methods used in pediatrics relating to the diagnosis and management of infectious diseases in children.
12. **GOAL:** Demonstrate high standards of professional competence while working with patients under the care of an Infectious Disease subspecialist.

1. GOAL: Immunodeficiency. Understand the role of the general pediatrician in the assessment and management of patients with immunodeficiency.

A. Identify the signs and symptoms of immunodeficiency diseases, and differentiate immunodeficiency from other causes of acute and chronic disease, as well as primary from secondary immunodeficiency disorders.

B. Organize immunodeficiency diseases into five pathophysiologic categories (antibody, cellular-mediated, combined, complement, phagocytic) and distinguish etiologic types (e.g., genetic, post-infectious, post-chemotherapy).

C. Discuss the indications, clinical significance and limitations of diagnostic tests and procedures to assess immune function. Interpret the results of tests of: CBC (especially evaluation for age-appropriate ALC and ANC), lymphocyte (T, B, NK cell) number and function, immunoglobulin levels, antibody function, mitogen and antigen assay for lymphocyte function, DTH skin testing, complement levels, and neutrophil assays, as well as laboratory evaluations for secondary immune disorders, such as HIV and CF.

D. Demonstrate the initial approach to evaluation, treatment and referral for a child with suspected immunodeficiency.

E. Discuss treatment options available for patients with primary immunodeficiency disorders and the potential harm of blood transfusions and vaccines in these patients.

F. Under supervision of an immunologist, develop a treatment plan for a child with immunodeficiency, including pharmacologic management, precautions, and immunizations.

2. GOAL: Understand the role of the pediatrician in preventing infectious diseases, and in counseling and screening individuals at risk for these diseases.

A. Provide routine counseling about infectious disease prevention to all parents and patients, addressing:

1. Common infectious diseases of childhood
2. Routine immunization for the prevention of common childhood infections and illnesses
3. The role of hand hygiene in preventing the spread of infectious diseases
4. Behaviors that reduce risk of infectious disease transmission and acquisition (e.g., breastfeeding, avoidance of exposure to environmental tobacco smoke, avoidance of crowded settings such as daycare, schools, institutions)
5. Behaviors that may spread HIV, such as unsafe sexual practices, needle sharing and pregnancy

B. Provide counseling to parents and patients with specific infectious diseases about:

1. HIV testing, transmission and follow-up
2. TB exposure, expected course, treatment and transmission
3. Hepatitis B expected course, treatment and transmission

C. Provide routine and appropriate screening for infectious disease processes.

1. Screen for tuberculosis in high-risk populations and as schools require.
2. Screen for hepatitis, parasites, and other disease processes in new immigrants as appropriate.
3. Counsel and screen pregnant women and screen newborns for HIV.
4. Screen sexually abused children for sexually transmitted diseases (STDs), such as gonococcal, chlamydia, human immunodeficiency virus, hepatitis B, and syphilis.
5. Screen sexually active adolescents for STDs at health visits.
6. Take measures to prevent Group B strep in newborns
7. List situations in which screening is not appropriate but may be requested (e.g., suspected exposure to bacterial meningitis).

D. Educate daycare organizations and providers about policies and methods that decrease the spread of infection in child care settings, and about unnecessary exclusion policies.

E. Discuss with parents how the overuse of antibiotics has contributed to the development of antibiotic-resistant strains of common pathogens, and help them to understand when withholding antibiotic treatment is safe and effective.

3. GOAL: Differentiate between normal and pathologic states related to infectious disease.

A. Describe normal variability in body temperature, the factors that regulate body temperature, and use of body temperature to identify infection. Include factors that influence normal core body temperature.

B. Explain to parents the significance and appropriate response to fever in children of various ages.

C. Compare and contrast different methods used to obtain body temperature, including type of thermometer (glass, digital, infrared radiation, skin strip) and measurement sites (axillary, oral, rectal, tympanic, skin).

D. Explain the symptoms and physical findings that suggest the presence of an infectious disease.

E. Take an exposure history that provides clues to a specific diagnosis (include questions about ill contacts, travel, pets or other animal exposures, occupation, insect bites and diet).

F. Explain the difference between a descriptive diagnosis based on the anatomic syndrome involved (e.g., exudative pharyngitis) and an etiologic diagnosis (e.g., Group A streptococcal infection) and the diagnostic studies appropriate for each type.

4. GOAL: Diagnose and manage infectious disease conditions that do not require referral.

1. Upper respiratory: common cold, pharyngitis, otitis media and externa, sinusitis and facial cellulitis
2. Oral/pharyngeal: herpetic gingivostomatitis, herpangina, oral thrush (candida), parotitis, parapharyngeal and odontogenic infections and enteroviral enanthems
3. Middle airway: croup syndrome, pertussis
4. Lower airway: pneumonia (chlamydial, mycoplasma, bacterial, viral), bronchiolitis and latent tuberculosis infection
5. GI tract: esophagitis, enteritides (bacterial, viral, parasitic, antibiotic associated colitis), hepatitis (A, E, G), Helicobacter pylori
6. Renal: urinary tract infections, differentiating between pyelonephritis and cystitis
7. Genital: urethritis, vaginitis, epididymitis, orchitis, cervicitis and uncomplicated pelvic inflammatory disease
8. CNS: aseptic meningitis, post-varicella encephalitis, and acute cerebellar ataxia associated with varicella
9. Skin: bacterial (impetigo, cellulitis, furuncles, carbuncles), dermatophytes, candidal dermatitis, infestations (scabies and lice), and viral (common warts, venereal warts, molluscum contagiosum and herpes simplex virus)
10. Eyes: conjunctivitis, blepharitis, hordeolum (sty) and preseptal (periorbital) cellulitis
11. Parasites: pinworms, Toxocara canis, ascariasis, hookworm and giardia
12. Systemic: viral exanthems (measles, varicella, herpes simplex virus, parvovirus, rubella, human herpes virus 6), zoonoses (cat scratch disease), and viruses (infectious mononucleosis syndrome with either Epstein-Barr virus, Cytomegalovirus, or toxoplasma, respiratory syncytial virus disease, influenza, enterovirus, adenovirus)
13. Perinatal: focal infections of the scalp, mastitis, omphalitis, Group B strep and candidal infections
14. Infants/toddlers: potential occult bacteremia
15. Adolescents: sexually transmitted diseases (see genital infections)
16. Fever without localizing signs in various age groups
17. Fever in patient with underlying disease (e.g., in a patient with congenital heart disease)

5. GOAL: Recognize and initiate therapy in patients with infectious disease conditions that require consultation or referral.

A. Identify, explain, initially manage, and refer the following infectious diseases:

1. Upper respiratory: mastoiditis
2. Oral/pharyngeal: peritonsillar, retropharyngeal and dental abscesses
3. Middle airway: epiglottitis, bacterial tracheitis, pertussis (symptoms requiring further evaluation and/or admission)
4. Lower airway: fungal pneumonia, severe or complicated pneumonia, parapneumonic effusion, empyema and lung abscess
5. Heart: endocarditis, thrombophlebitis, pericarditis, myocarditis, mediastinitis and acute rheumatic fever
6. GI tract: hepatic abcess, cholangitis/cholecystitis, chronic hepatitis B, C and D, hemolytic uremic syndrome, pancreatitis, appendicitis, peritonitis and abscess
7. Renal and perinephric abscesses
8. Genital: complicated PID and tubo-ovarian abscess
9. Musculoskeletal: osteomyelitis, septic arthritis, discitis and pyomyositis
10. CNS: complicated bacterial meningitis, brain abscess, epidural, subdural and paraspinal abscesses, encephalitis, transverse myelitis, peripheral neuropathies (diphtheria, botulism, tetanus), acute cerebellar ataxia not associated with varicella and Guillain-Barre, acute disseminated encephalomyelitis (ADEM), and partially treated meningitis
11. Soft tissue: staphylococcal scalded skin, toxic epidermal necrolysis, fasciitis
12. Eyes: orbital cellulitis, keratitis and endophthalmitis
13. Systemic: zoonoses/arthropod borne disease (brucella, leptospirosis, cat scratch, Ehrlichia, tularemia, Lyme, Rocky Mountain spotted fever) and Kawasaki disease
14. Intrauterine infections: CMV, rubella, parvovirus B19, syphilis, toxoplasmosis, herpes simplex virus (HSV) and varicella
15. Other: prenatal exposure to or congenital human immunodeficiency virus, acquired immunodeficiency syndrome, tuberculosis, systemic fungal infections, disseminated gonococcal infection, endotoxin shock, toxic shock, fever of unknown origin, fever and neutropenia, fever in immunocompromised patients
16. Immunocompromised hosts: acquired immunodeficiency syndrome, chemotherapy, steroid suppression, primary immunodeficiency, and organ or stem cell transplant recipient
17. Newborn: perinatal herpes, perinatal systemic fungal, varicella and enteroviral sepsis

B. Identify the role and general scope of practice of infectious diseases; recognize situations where children benefit from the skills of specialists trained in the care of children; and work effectively with these professionals to care for children with infectious diseases.
6. GOAL: Human Immunodeficiency Virus (HIV). Recognize, screen for, refer and co-manage patients with HIV.
A. Describe the pathophysiology, natural history, presenting signs and symptoms, and associated opportunistic infections in patients with HIV.
B. Identify the risk factors for perinatal transmission of HIV, tests for screening and confirmatory diagnosis, and indications for referral, including asymptomatic HIV infected patients.
C. Describe risk factors and symptoms that should prompt testing for HIV infection in neonates, children and adolescents.
D. Review HIV infection, the related risks of opportunistic infections, the use of laboratory parameters (e.g., CD4 counts and viral load measures) to monitor clinical course, general treatment modalities (including chemoprophylaxis), and the common complications and toxicities of anti-HIV medications.
E. Identify the indicators for referral of the patient to an infectious disease specialist.
F. Demonstrate the ability to obtain proper informed consent for HIV testing, including legal requirements in one's locale.
7. GOAL: Use of Antibiotics. Use antibiotics appropriately in managing infections in children.
A. When caring for pediatric patients with common infections, determine when and whether drug therapy should be instituted.
B. For common infections, demonstrate the ability to select an appropriate antibiotic, dose and route, based on antimicrobial mechanism of action, spectrum of activity, adverse effects, drug interactions, drug penetration and relative costs.
C. For certain common infections, such as otitis media and sinusitis, describe the circumstances when withholding antibiotic treatment may be safe and effective, what precautions should be used when withholding drug therapy, and strategies for achieving parental acceptance of withholding/delaying antibiotics.
D. Correctly prescribe antimicrobials based upon knowledge of local susceptibility/resistance patterns for common pathogens.
E. Review the role and thought process of the specialist when dealing with patients who have complex or life threatening illnesses, such as the use of static vs. bactericidal drugs, drug combinations and synergies, and monitoring patients for toxicity and efficacy.
F. Develop familiarity with several reliable resources for information on common antibiotics, resistance patterns and new treatments for infectious diseases, and consistently use current information when prescribing antibiotics.

8. GOAL: Immunizations. Use vaccines to prevent common childhood diseases.
A. Describe the currently recommended immunization schedules for preventing infections in children.
B. Administer routine immunizations with related counseling that addresses contraindications and common side effects, and obtain informed consent.
C. Give examples of circumstances justifying special immunizations, such as indications for influenza vaccine and pneumococcal vaccine, and vaccination of infants born to a hepatitis B carrier, immunosuppressed patients and family contacts (including those on steroids), HIV positive children, and children adopted from other countries.
D. Identify appropriate referral sources for children traveling internationally who may need additional vaccinations.
E. Identify reliable sources for up-to-date information on new vaccines and recommended administration.
F. Explain the rationale for routine immunizations to parents who question their necessity.
G. Describe current federal laws related to immunization of children and the requisite office documentation (including National Childhood Vaccine Injury Act and Vaccine Adverse Event Reporting System [VAERS]).
H. Describe quality control measures for effective office administration of common vaccines.
I. Explain effective methods to increase vaccination rates among children.
J. Discuss appropriate uses of passive antibodies including intravenous immunoglobulin (IVIG), hepatitis B immune globulin (HBIG), tetanus immune globulin (TIG), rabies immune globulin (RIG) and palivizumab.
K. Discuss use of immunization to prevent disease after known exposure to disease (e.g., varicella and measles).
9. GOAL: Infection Control. Understand principles of infection control in pediatric care settings.
A. Discuss principles of hospital-based infection control and employee health issues (as addressed by OSHA).
B. Explain the three forms of isolation precautions (contact, droplet, and airborne) and discuss which infections require which precaution.
C. Describe and follow current guidelines for infectious disease exclusion policies in school and daycare and explain their rationale.
D. Identify and manage infections commonly seen in day care settings.
E. Describe effective infection control procedures appropriate for day care, school and household settings.
F. Identify resources for up-to-date information on infection prevention and treatment for international travelers/adoptees.
G. Explain the indications for chemo- and immuno-prophylaxis in common infections (meningitis, hepatitis), including indications for use of gamma globulin and management of chicken pox exposure in the immunosuppressed child.
H. Counsel patients in the prevention of sexually transmitted diseases and report confirmed cases to local public health authorities.

I. Describe appropriate prophylaxis for persons exposed to certain illnesses (e.g., pertussis, measles, Haemophilus influenzae Type B infections, meningococcus, hepatitis A).

J. Recognize illnesses potentially associated with outbreaks (e.g., meningococcemia, E. coli O157:H7, cholera, measles, pertussis) and report confirmed or suspected cases to the local public health authorities.

K. Recognize illnesses consistent with bioterrorism (e.g., smallpox, anthrax) and report suspected cases to the local public health authorities.

10. GOAL: Understand the laboratory methods used in pediatrics relating to the diagnosis and management of infectious diseases in children.

A. Identify principles of office laboratory testing, including quality assurance and clinical laboratory improvement amendments (CLIA) regulations.

B. Identify specific tests available for the diagnosis of various infectious diseases. Know the importance of proper specimen collection and its effect on results, explain the limitations of those tests (sensitivity, specificity, predictive values, cost), and describe the difference between colonization with normal flora, colonization with a potential pathogen and infection.

C. Describe principles of clinical application of rapid diagnostic techniques for common pathogens (e.g., particle agglutination, rapid strep tests, monoclonal FA tests).

D. Discuss the principles and clinical application of the following:

1. Serologic tests such as Western immunoblot and enzyme-linked immunosorbent assay (ELISA)
2. Molecular biologic tests including: polymerase chain reaction (PCR), Southern Blot, and in situ hybridization
3. Susceptibility testing including: minimum inhibitory concentration (MIC), minimum bactericidal concentration (MBC), and synergy and antagonism
4. Antibiotic serum concentrations and serum bactericidal titers
5. Screening test results vs. diagnostic test results, and differences in the use and interpretation of such tests

11. GOAL: Demonstrate high standards of professional competence while working with patients under the care of an Infectious Disease subspecialist.

A. **Competency 1**: Patient Care. Provide family-centered patient care that is development- and age-appropriate, compassionate, and effective for the treatment of health problems and the promotion of health.

1. Use a logical and appropriate clinical approach to the care of patients presenting for specialty care, applying principles of evidence-based decision-making and problem-solving.

2. Describe general indications for subspecialty procedures and interpret results for families.

B. **Competency 2:** Medical Knowledge. Understand the scope of established and evolving biomedical, clinical, epidemiological and social-behavioral knowledge needed by a pediatrician; demonstrate the ability to acquire, critically interpret and apply this knowledge in patient care.

1. Acquire, interpret and apply the knowledge appropriate for the generalist regarding the core content of this subspecialty area.
2. Critically evaluate current medical information and scientific evidence related to this subspecialty area and modify your knowledge base accordingly.
3. Maintain accurate, legible, timely and legally appropriate medical records, including referral forms and letters, for subspecialty patients in the outpatient and inpatient setting.

D. **Competency 4:** Practice-based Learning and Improvement. Demonstrate knowledge, skills and attitudes needed for continuous self-assessment, using scientific methods and evidence to investigate, evaluate, and improve one's patient care practice.

1. Identify standardized guidelines for diagnosis and treatment of conditions common to this subspecialty area and adapt them to the individual needs of specific patients.
2. Identify personal learning needs related to this subspecialty; systematically organize relevant information resources for future reference; and plan for continuing acquisition of knowledge and skills.

E. **Competency 5**: Professionalism. Demonstrate a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to diversity.

1. Demonstrate personal accountability to the well-being of patients (e.g., following up on lab results, writing comprehensive notes, and seeking answers to patient care questions).
2. Demonstrate a commitment to carrying out professional responsibilities.
3. Adhere to ethical and legal principles, and be sensitive to diversity.

F. **Competency 6:** Systems-based Practice. Understand how to practice high-quality health care and advocate for patients within the context of the health care system.

1. Identify key aspects of health care systems as they apply to specialty care, including the referral process, and differentiate between consultation and referral.
2. Demonstrate sensitivity to the costs of clinical care in this subspecialty setting, and take steps to minimize costs without compromising quality
3. Recognize and advocate for families who need assistance to deal with systems complexities, such as the referral process, lack of insurance, multiple medication refills, multiple appointments with long transport times, or inconvenient hours of service.
4. Recognize one's limits and those of the system; take steps to avoid medical errors.

Procedures

A. GOAL: Describe the following procedures, including how they work and when they should be used; competently perform those commonly used by the pediatrician in practice.

1. Abscess: I & D of superficial abscesses
2. Abscess: aspiration

3. Bladder: catherization
4. Conjunctival swab
5. Lumbar puncture
6. Medication delivery: IM/SC/ID
7. Medication delivery: IV
8. PPD: placement
9. Rectal swab
10. Skin scraping
11. Sterile technique
12. Suctioning: nares
13. Thoracentesis
14. Throat swab
15. PPD: interpretation
16. Radiologic interpretation: chest X-ray
17. Radiologic interpretation: sinus films
Adapted From Kittredge, D., Baldwin, C. D., Bar-on, M. E., Beach, P. S., Trimm, R. F. (Eds.). (2004). APA Educational Guidelines for Pediatric Residency. Ambulatory Pediatric Association Website. Available online: www.ambpeds.org/eg