Although COVID-19 has impacted many children, severe disease is rare and most recover with supportive care. Manifestations are diverse and often nonrespiratory. Adolescents/children with medical comorbidities are at risk for severe respiratory compromise. The most serious manifestation in previously healthy children is a delayed multisystem inflammatory syndrome with cardiac compromise in severe cases. Anti–SARS-CoV-2 monoclonal antibodies are available for adolescents at risk of progression and not hospitalized. Therapeutic options for severe respiratory disease with hypoxia include remdesivir and glucocorticoids. Therapies for multisystem inflammatory syndrome in children include intravenous immunoglobulin and glucocorticoids. Refractory cases may benefit from additional immunomodulators.

COVID-19 is a nonspecific viral illness caused by a novel coronavirus, SARS-CoV-2, and led to an ongoing global pandemic. Transmission is primarily human-to-human via contact with respiratory particles containing infectious virus. The risk of transmission to health care personnel is low with proper use of personal protective equipment, including gowns, gloves, N95 or surgical mask, and eye protection. Additional measures affecting the risk of transmission include physical distancing, hand hygiene, routine cleaning and disinfection, appropriate air handling and ventilation, and public health interventions such as universal masking and stay-at-home orders.

Measles virus is an RNA virus that causes the highly contagious childhood exanthem. Despite the presence of a safe and effective vaccine, in 2018, measles was responsible for more than 140,000 deaths worldwide, most of which were in children less than 5 years of age. Mortality is primarily associated with the complications of secondary bacterial and viral infections causing pneumonia but also diarrhea. Recent outbreaks have reinvigorated interest in maintaining herd immunity to prevent continued resurgence of disease and associated comorbidities.
Tuberculosis in Children
Devan Jaganath, Jeanette Beaudry, and Nicole Salazar-Austin

Tuberculosis (TB) is one of the leading causes of mortality in children worldwide, but there remain significant challenges in diagnosing and treating TB infection and disease. Treatment of TB infection in children and adolescents is critical to prevent progression to TB disease and to prevent them from becoming the future reservoir for TB transmission. This article reviews the clinical approach to diagnosing and treating latent TB infection and pulmonary and extrapulmonary TB disease in children. Also discussed are emerging diagnostics and therapeutic regimens that aim to improve pediatric TB detection and outcomes.

Management and Prevention of Staphylococcus aureus Infections in Children
Ibukunoluwa C. Kalu, Carol M. Kao, and Stephanie A. Fritz

Staphylococcus aureus is a common skin commensal with the potential to cause severe infections resulting in significant morbidity and mortality. Up to 30% of individuals are colonized with S. aureus, though infection typically does not occur without skin barrier disruption. Infection management includes promptly addressing the source of infection, including sites of metastatic infection, and initiation of effective antibiotics, which should be selected based on local antibiotic susceptibility patterns. Given that S. aureus colonization is a risk factor for infection, preventive strategies are aimed at optimizing hygiene measures and decolonization regimens for outpatients and critically ill children with prolonged hospitalizations.

Implant-Associated Spinal Infections in Children: How Can We Improve Diagnosis and Management?
Jason Lake and Oren Gordon

Implant-associated spinal infection affects up to 10% of all pediatric instrumented spinal fixation surgeries and is associated with patient morbidity and significant impact on the health care system. Children with neuromuscular scoliosis are at increased risk compared with those with idiopathic scoliosis. Early infections (≤90 days from index surgery) are caused by virulent pathogens such as Staphylococcus aureus; more indolent pathogens cause late infections. Early infections are treated with debridement and implant retention with prolonged antibiotics, but implant removal is often needed to treat late infections. Antibiofilm agents and pathogen-specific imaging may improve future outcomes.

Antiviral Therapeutics in Pediatric Transplant Recipients
William R. Otto and Abby Green

Recipients of solid organ and hematopoietic stem cell transplantation undergo substantial immune suppression, placing them at risk for opportunistic viral infection. Few randomized controlled trials have been dedicated to the treatment of viral infections in children, and current practices are extrapolated from data generated from adult patients. Here we discuss the prevention and treatment of viral infections using available antiviral drugs, as well as novel agents that may provide benefit to pediatric patients in the future.
Contemporary Treatment of Resistant Gram-Negative Infections in Pediatric Patients

Samantha A. Basco and Jennifer E. Girotto

Gram-negative resistance is increasing in serious infections, including in children. There are many mechanisms of resistance, most commonly beta-lactamases. The most concerning beta-lactamases are AmpC, extended spectrum beta-lactamases, and carbapenemases. Efflux pumps and porins are also important in Pseudomonas infections. For some mechanisms of resistance, dose adjustment of antibiotics may help to overcome resistance and effectively treat infections. Therefore, it is important to consider pediatric pharmacokinetic differences when dosing antibiotics to ensure adequate concentrations are reached and maintained. These considerations important for older antibiotics and newer agents.

The Current State and Future Directions of Inpatient Pediatric Antimicrobial Stewardship

Rebecca G. Same

Antibiotic use in hospitalized children is highly variable and often unnecessary, which puts children at risk of antibiotic-associated harms including adverse drug events, antibiotic resistance, and long-term chronic health problems. Antimicrobial stewardship programs reduce unnecessary antibiotic use through antimicrobial review, the development of guidelines and clinical decision-support tools, diagnostic stewardship, and other targeted interventions. Future directions for inpatient stewardship include increased collaboration with nurses, utilization of implementation science to close the gap between evidence-based recommendations and practice changes, and the extension of stewardship from large academic centers to smaller hospitals.

Targets and Methods to Improve Outpatient Antibiotic Prescribing for Pediatric Patients

Nicole M. Poole and Holly Frost

Antibiotics are overprescribed for children in outpatient settings, primarily for the diagnosis of acute respiratory tract infections. The overuse of antibiotics leads to antibiotic-resistant infections, avoidable adverse drug events, and chronic inflammatory conditions in children. Decreasing unnecessary antibiotic use is therefore a public health priority. In this article, the authors describe the burden of antibiotic prescribing to children in outpatient settings, identify targets for improvement, and use national recommendations as a guide to describe pragmatic methods to measure and improve antibiotic prescribing for children in outpatient settings.

Diagnostic Stewardship in the Pediatric Intensive Care Unit

Anna C. Sick-Samuels and Charlotte Woods-Hill

In the pediatric intensive care unit (PICU), clinicians encounter complex decision making, balancing the need to treat infections promptly against the potential harms of antibiotics. Diagnostic stewardship is an approach to optimize microbiology diagnostic test practices to reduce unnecessary antibiotic treatment. We review the evidence for diagnostic stewardship of
blood, endotracheal, and urine cultures in the PICU. Clinicians should consider 3 questions applying diagnostic stewardship: (1) Does the patient have signs or symptoms of an infectious process? (2) What is the optimal diagnostic test available to evaluate for this infection? (3) How should the diagnostic specimen be collected to optimize results?

Management of Children with Reported Penicillin Allergies

Tracy N. Zembles, David E. Vyles, and Michelle L. Mitchell

Penicillin allergy is the most commonly reported medication allergy. Reported allergy is associated with increased morbidity and mortality. Risk categorization tools can help determine the optimal testing strategies to delabel patients with reported allergy. Approaches to allergy removal include oral challenge in low-risk patients and skin testing in high-risk patients. Many different locations may be used to test for allergy, including ambulatory care clinics, inpatient units, and emergency departments. Interventions (eg, use of the electronic medical record) are needed to ensure that once the allergy is removed, this information is effectively transmitted to the patient and appropriate providers.