

4.11 INFECTION CONTROL AND ANTIMICROBIAL STEWARDSHIP

Introduction

Infections are one of the most common causes of hospitalization, morbidity, and mortality among children. Infections due to antibiotic resistant bacteria are an increasing burden on public health. Antibiotic exposure in both the ambulatory and hospital settings is a prime driver for development of antibiotic resistance and is a risk factor for developing infections which are increasingly due to multi-drug resistant organisms (MDROs). As the number of children surviving with significant medical complexity grows, the incidence of device-associated infections and of hospital-acquired (nosocomial) infections (HAI) is also rising. In addition, children are often more severely impacted when community outbreaks of infectious diseases occur, requiring rapid identification, containment, and treatment while limiting unnecessary antibiotic exposure. Pediatric hospitalists play a vital role in minimizing antimicrobial treatment risks to children through the judicious use of antimicrobials and participation in antimicrobial stewardship programs and practices.

Knowledge

Pediatric hospitalists should be able to:

- Describe common infection prevention measures used to reduce the spread of infection, including vaccinations, hand hygiene, and the use of personal protective equipment (PPE).
- Define commonly used infection control terms for precautions, such as standard, contact, droplet, airborne, protective (reverse) isolation, and transmission-based, and give an example of each.
- Explain the difference between community-acquired and hospital-acquired infections.
- Explain why antibiotic exposure is a prime driver of antibiotic resistance.
- Cite examples of commonly used daily practices that are integral to antimicrobial stewardship, such as judicious initiation of antimicrobials, appropriate use and interpretation of diagnostic microbiology, and narrowing the spectrum or discontinuation of antimicrobials.
- Delineate the risk for and types of infections associated with commonly used temporary medical devices, such as urinary catheters, intravenous access lines, chest tubes, nasogastric tubes, and others.
- Delineate the risk for and types of infections associated with common chronic medical devices, such as tracheostomy tubes, ventriculoperitoneal shunts, and others.
- Distinguish between empirical and definitive antimicrobial prescribing.
- Review the risks of repeated antimicrobial empiric therapy use for children with chronic medical complexity, attending to antimicrobial resistance for the host and community, antimicrobial side effects, and drug-drug interactions that may limit antimicrobial effectiveness.

- List common adverse effects of frequently prescribed antibiotics and antivirals for children hospitalized with routine infections, such as pneumonia, cellulitis, and fever in the infant, and discuss how antimicrobial stewardship and infection control practices may minimize these risks.
- List common strategies used by antimicrobial stewardship programs to optimize appropriate antimicrobial use, including prospective audit and feedback, formulary restrictions, automated stop dates for prescribed antibiotics, and 48-hour timeouts.
- Summarize common infection control practices used to minimize the risk of HAIs, including catheter-related bloodstream infections, urinary catheter infections, and others.
- List common multiple-drug resistant organisms (MDROs) and distinguish between infection control practices for these organisms compared to other infectious organisms.
- Review the clinical presentation of *Clostridium difficile* infection in children and discuss risk factors for it, including antibiotic exposure.
- Describe the relationship between antimicrobial stewardship, patient safety, and quality improvement, including clinical practice guidelines.
- Discuss how the hospital may be a potential venue for initial recognition of a community infectious disease outbreak and review the role that pediatric hospitalists can play in patient triage, admission decision-making, management, and hospital flow, attending to local context and resources.
- Review the relationship between community infection outbreaks and vaccination rates and discuss the role pediatric hospitalists can play in vaccination of hospitalized children.
- List which communicable diseases are mandatory to report to the local or state Department of Health.

Skills

Pediatric hospitalists should be able to:

- Demonstrate skills in recognizing the need for and ordering appropriate isolation precautions for children hospitalized with acute infection symptoms.
- Determine the need for and order appropriate contact precautions for children hospitalized with a history of MDRO infection, including methicillin-resistant *Staphylococcus aureus* (MRSA) and multi-drug resistant gram-negative bacteria.
- Select and order appropriate diagnostic studies for commonly encountered infections, including serologies, polymerase chain reaction (PCR) tests, cultures and sensitivities for varied organisms (including bacterial, viral, and fungal), and other rapid diagnostic testing for pathogens as available in the local context.
- Interpret diagnostic testing results efficiently and initiate appropriate treatment based on the results.
- Interpret diagnostic testing performed related to medical devices, distinguishing between infection and colonization, and initiate or change treatment based on the results.
- Participate actively in infection prevention and control programs.

- Utilize antimicrobial best practices that are embedded in local clinical pathways.
- Identify common signs and symptoms of possible device-associated infection.
- Interpret a hospital antibiogram to guide selection of antibiotic therapy.
- Identify opportunities to limit antimicrobial exposure among hospitalized children receiving empirical antibiotic therapy and initiate action for a given patient or population of patients.
- Develop and execute antibiotic treatment plans that maximize the safety of antibiotic use, including transitions to oral antibiotics when appropriate, limiting treatment duration, and discontinuing antibiotics.
- Communicate and educate patient and the family/caregivers regarding the risks and benefits of antimicrobial treatment and the importance of adhering to infection control practices, including rules regarding visitation during infectious seasons or outbreaks.

Attitudes

Pediatric hospitalists should be able to:

- Recognize that infection control practices are a primary means of reducing the risk of harm to hospitalized children.
- Reflect on the importance of collaboration with infectious diseases specialists and pharmacists to improve the judicious use of antibiotics.
- Role model infection control practices at the bedside including appropriate empirical and definitive antibiotic therapy practices.
- Reflect on the impact that infection control practices may have on patients and the family/caregivers.

- Recognize how adhering to infection control practices and antimicrobial stewardship for a given patient influences risks for the patient and the larger community.

Systems Organization and Improvement

In order to improve efficiency and quality within their organizations, pediatric hospitalists should:

- Collaborate with hospital staff, infection prevention specialists, hospital epidemiologists, microbiology laboratory, and others in multidisciplinary initiatives to monitor and prevent community-acquired and nosocomial infections.
- Coordinate or participate in the local antimicrobial stewardship program to develop and implement evidence-based guidelines for antimicrobial use.
- Lead, coordinate, or participate in the local program to reduce the incidence of hospital-acquired infections.
- Lead, coordinate, or participate in efforts to educate staff, trainees, patients, and the family/caregivers on the importance of infection control and antimicrobial stewardship.

References

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2. Fishman N, Patterson J, Saiman L, et al. Policy statement on antimicrobial stewardship by the Society for Healthcare Epidemiology of America (SHEA), the Infectious Diseases Society of America (IDSA), and the Pediatric Infectious Diseases Society (PIDS). *Pediatric Infect Control Hosp Epidemiol.* 2012;33(4):322-327. <https://doi.org/10.1086/665010>.
3. Baur D, Gladstone BP, Burkert F, et al. Effect of antibiotic stewardship on the incidence of infection and colonization with antibiotic-resistant bacteria and *Clostridium difficile* infection: A systematic review and meta-analysis. *Lancet Infect Dis.* 2017;17(9):990-1001. [https://doi.org/10.1016/S1473-3099\(17\)30325-0](https://doi.org/10.1016/S1473-3099(17)30325-0).