Pediatric Clinical Microbiology: It’s the Little Things

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Is the practice of clinical microbiology of children different from that of adults? It certainly is! The differences are driven by higher rates of certain infections in children, challenges in specimen collection that are specific to children, and the effect of the microbiota on the utility of some diagnostic tests in children. We are pleased to present three minireviews on clinical microbiology of children in this issue of Journal of Clinical Microbiology (1–3). These were written by some members of an ad hoc group of pediatric clinical microbiologists that two of us (C. D. Doern and J. J. Dunn) convened at the General Meeting of the American Society for Microbiology in 2015. There was a consensus in that group that expert minireviews on various topics in pediatric clinical microbiology would be valuable to the community of clinical microbiologists.

Children are vulnerable to a number of infections to which adults have greater resistance, and the etiologies and manifestations of infections in pediatric patients are often distinctly different and more severe than those seen in adults. While no infectious diseases are exclusive to children, many are much more common in children than in adults. There are several reasons for this. First, lack of immune defenses in children makes them more likely to get some infections, including respiratory virus infections, meningitis, or streptococcal pharyngitis. To take a specific example, Kingella kingae is one of the most common causes of joint infections in children 6 to 36 months of age, among whom it is also commonly found among the microbiota of the oropharynx. K. kingae rarely causes infections in people older than 36 months of age, likely due to development of immunity to the organism (4). A second reason some infections are more common in children than adults is that children’s behaviors can lead to increased risk for acquisition of some infections. For example, Baylisascaris procyonis infection is acquired by eating the eggs of this parasite, which are found in raccoon feces in the environment (5). Nearly all reported cases have occurred in children younger than 3 years old, likely due to increased exposure to the pathogen due to eating soil contaminated with the eggs. A third reason that children are at greater risk for some infections is that there are anatomic differences between children and adults. Children get frequent ear infections because they have shorter, flappier, and more-horizontal Eustachian tubes than adults, and they are more likely to get osteomyelitis following hematogenous spread of bacteria, perhaps because of slow, turbulent blood flow in the blood vessels in the growth plates of long bones (6, 7). The expertise for diagnosing these infections is primarily found in those laboratories that serve significant numbers of children.

There are challenges in specimen collection that are unique to children. Young children cannot expectorate sputa, and so collecting specimens for detection of lower-respiratory tract infections is challenging. This is discussed in the minireview about testing for M. tuberculosis in children (1). In addition, young children cannot control their bladders or bowel, making collection of specimens for urinary tract infections and gastrointestinal infections difficult. A forthcoming issue of Journal of Clinical Microbiology will include a minireview that discusses diagnostic testing for urinary tract infections in children, including the appropriate methods of specimen collection. Finally, because small children have low blood volumes, they are vulnerable to anemia induced by collection of blood for diagnostic testing. This is a particular concern with blood culture, and this issue is discussed in detail in the review about diagnosis of bloodstream infections in children (2).

Finally, the microbiota that colonizes children differs from the microbiota of adults in ways that affect the utility of some diagnostic tests. Children are colonized with Clostridium difficile at a higher rate than are adults, and this makes differentiating symptomatic infection from asymptomatic colonization with this organism even more difficult in children than it is in adults (3). This concern is well known to clinical microbiologists, but another effect of colonizing bacteria on diagnostic testing is not so widely appreciated. Tests for urinary antigens for Streptococcus pneumoniae have poor specificity for detection of invasive infection with this bacterium, and this is thought to be associated with the high rate of colonization with this organism in children (8).

It’s important for laboratorians to be aware of the specific needs and unique features of children in order to provide comprehensive pediatric clinical microbiology services. We hope these minireviews are useful, particularly to those clinical microbiologists practicing in hospitals that see smaller numbers of children. More importantly, we hope that these contribute, even in a small way, to providing the best possible medical care to children.

REFERENCES


5. Graef-Teixeira C, Morassutti AL, Kazacos KR. 2016. Update on baylisas-

