The Never-ending Quest to Detect Bacteremia: Time for a Culture Change

“If we’re drawing blood, we might as well throw in a blood culture.” This pervasive and seemingly innocuous statement, intended perhaps to save a child from an additional poke or to prevent a provider from having to come back and write another order, illustrates a dramatic misconception about the perceived benign nature of this common laboratory test. If you are skeptical about this misconception, try quizzing your trainees or colleagues about the risks of a blood culture the next time they want to order one. Many will give you a blank stare. Some will tell you about contaminated cultures, and the well-read might even be able to cite published data on the risk of contamination, where estimates are generally in the 1% to 5% range, but have been reported to be as high as 11% to 12% in select populations. If a new venipuncture is required for the blood culture, some might appropriately express concern over the child’s resultant pain and anxiety, an important yet understudied harm in hospitalized children. However, few of your respondents (who at this point really just want to move on to the next patient) are likely to be concerned about overdiagnosis: the detection of abnormalities that would not have caused harm. After all, why would we question the utility of a test that found precisely what it is we were looking for?

An article in this issue of Hospital Pediatrics begins to scratch the surface of this provocative question. Parikh et al pose their own question in the article’s title: “Do You Need This Blood Culture?” In a retrospective investigation at a large children’s hospital, the authors examined the ordering of blood cultures over a 1-year period for 4 common inpatient pediatric diagnoses: bronchiolitis, asthma, skin and soft tissue infections (SSTIs), and community-acquired pneumonia (CAP). For 3 of these conditions (bronchiolitis, asthma, and SSTIs), the available evidence and existing guidelines do not support routine blood cultures. For CAP, although published guidelines do recommend obtaining blood cultures in hospitalized patients, the yield is low and the risk:benefit ratio questionable. Nonetheless, blood cultures were ordered frequently for all 4 diagnoses in this study. Cultures were ordered most commonly in SSTIs (46% of patients) and CAP (36%), but not infrequently in asthma (4%) and bronchiolitis (15%).

Blood culture positivity was extremely rare: no cultures were positive in asthma or bronchiolitis, 1% were positive in CAP, and 2% were positive in SSTIs. Five of the 343 children who had blood cultures obtained had pathogenic growth, and the authors surmised from chart review that these results did not appear to influence management. On the other hand, 4 children had growth of a contaminant, which appeared to drive unnecessary antibiotics, additional testing, return visits, and prolongation of the hospitalization. In short, none of the 343 children benefited...
from a blood culture, but a small handful of children were harmed.

The authors might have included urinary tract infection (UTI) in their analysis, a condition in which blood cultures are frequently ordered, especially in young infants, but where the benefits are unclear. Like children with CAP and SSTI, children with UTI receive antibiotics regardless of the blood culture result. However, whereas a positive blood culture in CAP and SSTI might help tailor antibiotic coverage, with UTI the identification and sensitivity are already available from the urine culture. Therefore, the changes in management that occur after a positive blood culture are simply more blood cultures and an extended intravenous antibiotic course and hospitalization. Whether this additional burden on the infant, family, and health care system is warranted is unclear, especially given that bacteremic infants tend to look very similar on presentation to infants with nonbacteremic UTI. So, it is also time to start asking whether we “need this blood culture” in an infant with presumed UTI.

The need for a blood culture in any patient should be assessed by a thorough evaluation of risks and benefits, and quantification of the potential risks/harms of blood cultures should be a high priority for future research. Some related questions need to be answered. For example, *Staphylococcus aureus* is emerging as a leading cause of bacteremia in otherwise healthy young infants. However, *S aureus* is also a common skin organism. In infants without SSTIs, how should we treat *S aureus* bacteremia? Can we differentiate pathogenic *S aureus* from contaminant *S aureus*? A second question relates to the increasing concern that many blood culture volumes are too small, and that larger volumes will have higher yields. This concern, which is driving some hospitals to enact policies mandating minimum blood culture volumes of 10 mL or more, may be warranted under the assumption that the detection of positive blood cultures always confers benefit to patients. But Parikh et al remind us that this is not necessarily the case. The increased sensitivity that will result from larger blood culture volumes threatens not only to compromise culture specificity (ie, more false positives), but also to increase the probability of overdiagnosis.

Before routine vaccination for *Haemophilus influenzae* and *Streptococcus pneumoniae*, bacteremia was relatively common in young children, and the frequent ordering of blood cultures was more justifiable (although even with pneumococcal bacteremia, overdiagnosis was a concern). Over the past few decades, however, the bacterial landscape in children has changed significantly. Bacteremia in otherwise healthy children is now exceedingly rare. When will our test-ordering behavior catch up?

**REFERENCES**


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