As with many relatively small, retrospective studies, it is quite possible that few practitioners will alter their sedative practices based solely on the current study. However, the authors should be congratulated for what their contribution adds to our understanding of dexmedetomidine use in a diverse population of critically ill children. Perhaps more importantly, the authors should be thanked for the deficiencies in available data that their study highlights and the need for additional research that is required. Specifically, their data point out that we need to better understand the role of dexmedetomidine as a primary (vs rescue) agent, that we need to more rigorously evaluate the risks of and for dexmedetomidine tolerance and withdrawal, and that data regarding the impact on adjunct medication use, hemodynamic effects, and extubation potential with higher doses are necessary. Thus, although I think it is safe to say that our patients can continue sleep with dexmedetomidine, our critical care community needs to remain awake and continue to delve.

REFERENCES

Overextending and Overtreating: The Role of Tracheal Aspirate Cultures in the Diagnosis and Management of Ventilator-Associated Infections*

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V entilator-associated pneumonia (VAP) remains one of the most targeted and probably the most overtreated, nosocomial infections in the PICU, accounting for more than half of all PICU antibiotic use (1). Despite this, the optimal diagnostic standards for VAP and its relative, ventilator-associated tracheitis/tracheobronchitis (VAT) remain illusive (2). Importantly, despite all the attention and consequent reduction in VAP and VAT rates (3, 4), patient outcome has not been shown to have improved.

In this issue of Pediatric Critical Care Medicine, Willson et al (5) present an insightful reflection on the murky waters of VAP and VAT by means of a survey using three hypothetical clinical scenarios. Members of the Pediatric Acute Lung Injury and Sepsis Network were asked to provide their approach to
respiratory specimen choice and the resulting decision to initiate antibiotic treatment, in simple cases of intubated children with mild fever and leukocytosis, in the absence of chest radiograph changes.

Although it is not clear what the responding physicians were actually looking for or treating in terms of a diagnosis (VAP/VAT/other), it is alarming that the vast majority would obtain a tracheal aspirate (TA) and would initiate antibiotic therapy, almost solely on the basis of the “bacterial pathogenicity” of the TA-cultured organism (5).

The routine use of TA in critically ill children has been advocated by some groups in order to guide empirical therapy should VAP develop in patients subsequently—presuming that colonization precedes and/or predisposes to infection (6, 7). Similarly, some authors advocate for the targeted treatment of VAP either as a possible precursor to VAP or as an entity in its own right (8). This supports the practice of the respondents to the study by Willson et al (5) to some extent but is not supported by good evidence.

Clearly, there needs to be a balance between failing to treat potential pathogens which could lead to poor patient outcome, and unnecessary treatment of colonizing organisms, which predisposes to infection with multidrug-resistant pathogens (9, 10). TA-based surveillance may not be the ideal solution to creating this balance, as highlighted in the accompanying article (5).

In order for TA to be useful (and not harmful) in the management of VAP, it is essential that results are considered and acted on in the context of the clinical presentation (11). It has recently been confirmed that TA culture and Gram stain lack specificity in the diagnosis of pulmonary infection in children and are unable to distinguish between infection and colonization (12). Furthermore, positive bacterial cultures of TAs were shown to increase rapidly after intubation, with 90% positive after 3 days of intubation (> 10^4 cfu/mL), usually culturing potentially pathogenic bacteria. About half the TAs had more than 25 polymorphonuclear cells/low power field (evidence of inflammation) between 1 and 3 days after intubation. Thus, half of all TAs submitted for suspected VAP/VAT are likely to be positive, even in the absence of infection (12). Furthermore, if the TA is “positive,” it is likely to be treated, again regardless of actual infection state (5). This is worrying but is indicative of actual PICU practice, where the mere presence of fever and mild leukocytosis in conjunction with positive TA culture seems to justify prolonged antibiotic treatment (5). Consequently, there is a need to identify methods to reliably distinguish between colonization and actual infection.

These related studies have also highlighted a lack of standardization in obtaining and analyzing TA, with an alarming (but perhaps not surprising) increase in positive culture when specimens are taken using an in-line, closed system suction catheters (5, 12).

Antibiotics are expensive, may have severe adverse effects, and have the vast potential for selecting out multidrug-resistant organisms (10), particularly in the ICU environment (13). Common errors with regard to antibiotic use include prescribing antibiotics in the absence of infection, using broad spectrum instead of targeted antimicrobials, extending therapy duration unnecessarily, and treating contaminants or colonizing organisms (14). The Centers for Disease Control has highlighted the need to improve antibiotic use as one of four key strategies to address the problem of antibiotic resistance in the United States (15), but this should also be considered a global imperative.

Instead of using VAP surveillance, with regular respiratory sampling of dubious quality, perhaps we should move beyond simple antibiotic stewardship policies toward “antibiotic surveillance” programs—to systematically monitor antibiotic use, to relate prescription with indication (including whether the patient is truly infected or merely colonized), and importantly, to audit patient response to therapy and outcomes. It has been suggested that this simple approach could substantially reduce antibiotic usage at virtually no extra cost (1).

Biomarkers such as procalcitonin and C-reactive protein may offer objective methods to distinguish between infection requiring antibiotic treatment and colonization (or viral infection), as well as guiding the discontinuation of antibiotic therapy (16, 17). Invasive specimens like bronchoalveolar lavage (done blindly or bronchoscopically in a standardized manner) could provide a more specific diagnosis of pathogenic lower respiratory tract bacteria (18, 19).

Further research is warranted regarding promising new treatment options for pediatric VAP and VAT—including the possibility of limiting systemic antibiotics in favor of aerosolizing or instilling antibiotics directly into the respiratory tract. Aerosolized antibiotics may deliver high local concentrations of antimicrobial, but with low systemic exposure, with the potential of shorter duration of antibiotic exposure. This offers the clinical potential of improved efficacy and reduced antibiotic resistance (20–23). Direct instillation is even simpler to perform than nebulization as it does not require any additional equipment (22).

Unfortunately, we are currently unable to properly determine the relative sensitivities and specificities of different diagnostic methods or the efficacy of different treatment strategies for VAP. Without a gold standard, we are lost in terms of optimal diagnosis and valid outcome measures for meaningful clinical studies of pediatric ventilator-associated infections. Until we have that gold standard, and start talking the same language, we all need to exercise more caution in the surveillance, diagnosis, and treatment of ventilator-associated events in the PICU.

REFERENCES


What Is My Child’s Outcome? A Simple Question With a Complex Answer*

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Understanding the prognosis of a child at or after admission to a PICU and communicating this effectively to the family is an integral part of modern pediatric critical care. This is even more important after an unplanned admission, an emergency situation, or after major elective surgery. This is exacerbated in situations where an unexpected need for a mechanical circulatory machine has occurred.

*See also p. 720.

Key Words: cardiac surgery; extracorporeal life support; outcome

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