Improving Value in Bronchiolitis Care

Alan R. Schroeder, MD; Julia A. Marlow, MD; Chris P. Bonafeide, MD, MSCE

Promoting high value care. Safely doing less. Deimplementing overused interventions. These aspirational concepts are increasingly being invoked in health care as we strive for better outcomes delivered within a system free of ineffective, unnecessary, and wasteful practices. The most immediate, obvious targets of these calls to action are high-frequency, non–evidence based interventions for high-prevalence conditions. As such, bronchiolitis, a leading cause of hospitalization and urgent care and emergency department visits in young children, has been a prime target. Bronchiolitis is common, costly, and frequently triggers a downstream cascade of testing and treatment. Four of the five 2013 Pediatric Hospital Medicine Choosing Wisely recommendations involve bronchiolitis care,1 highlighting the pervasive sentiment that all too often we fail hospitalized children with bronchiolitis by delivering ineffective, wasteful, and potentially harmful care. Two recent studies provide valuable information on progress to date. The study by House et al2 reviewed temporal trends in nonrecommended therapies, and the study by Stollar et al3 provided further insights into one of the more vexing issues—overreliance on pulse oximetry.

Using the Pediatric Health Information System (PHIS) database, House et al2 examined temporal trends in the use of common therapies in the emergency department and inpatient settings. The authors’ intent was to analyze the impact of the 2014 American Academy of Pediatrics (AAP) Bronchiolitis Guideline revision.4 They used an interrupted time series approach to better understand whether observed trends could be explained by the guidelines. Their analysis of 404 203 emergency department and 198 172 inpatient discharges occurring between 2006 and 2019 demonstrated that nonrecommended interventions declined consistently during the time period, but that (for albuterol particularly) the decline became more rapid after the 2014 guidelines. This shift is important given that the 2014 guideline revisions discouraged a bronchodilator trial, in contrast to the original 2006 guidelines which suggested consideration of a trial. Declines in nonrecommended therapies were not associated with any changes in admission rate or hospital length of stay. These findings are good news. For the most common cause of hospitalization in infants, health care value has improved considerably. Whether and how guidelines impact clinical practice is often debated. The study by House et al2 suggests that guidelines have led to better care.

Overreliance on pulse oximetry has been another target for deimplementation in bronchiolitis that, unfortunately, because of limitations of the PHIS database, were not included in the otherwise valuable analysis from House and colleagues.2 Pulse oximetry use is associated with unnecessary hospitalization and prolonged length of hospital stay because of overdiagnosis of hypoxemia.5 The pulse oximeter detects borderline low saturations, and these readings drive practitioners to react, even when these so-called abnormalities belie the infant’s clinical appearance. The revised 2014 AAP guidelines that formed the scientific premise for the analysis by House and colleagues2 were noteworthy on this front given the recommendation to avoid continuous pulse oximetry (CPOX) in patients not receiving oxygen. This recommendation is similar to the 2013 Choosing Wisely recommendation,1 and later, the 2020 Best Evidence for Effective Monitoring Practice (BEEP) guidelines,6 making CPOX an opportune target for deimplementation. Although we do not have any data on temporal trends in CPOX use, a recent study suggests that the practice is still common and remarkably variable across hospitals.7

The notion that hypoxemia is overdiagnosed in bronchiolitis is driven in part by studies demonstrating that oxygen desaturations are common not only in outpatients with mild bronchiolitis, but also in healthy young infants in general.5 Many of these desaturations are striking
levels that might trigger a rapid response and escalation of care if they were observed in the inpatient setting. But when undetected in real time, the desaturations are not associated with any apparent harm. Blissfully unaware of their brief, self-limited hypoxemia, infants go on to enjoy their peaceful, alarm-free slumber.

The recent study by Stollar et al3 further corroborates previous studies and provides novel insights as well. In this prospective cohort study conducted during the 2017 to 2018 and 2018 to 2019 bronchiolitis seasons in one Swiss hospital, oxygen saturations were recorded in 239 otherwise healthy infants with bronchiolitis. This study was unique in that patients were enrolled whether they were admitted to the hospital or discharged to home. Similar to the findings from prior studies, desaturation to less than 90% was common, occurring in 165 patients (69%). Desaturation rates were not significantly different between hospitalized and discharged infants. These findings remind us that the more we look for abnormalities, the more we find them. As often occurs with overdiagnosis, finding abnormalities drives interventions but does not appear to benefit (and may harm) our patients.

Deimplementation of CPOX use, as recommended by Choosing Wisely, the AAP bronchiolitis guidelines, and BEEP, would decrease the probability that these inconsequential desaturations will be detected. By limiting overreliance on CPOX, we should see decreases in hospital admission, oxygen use, and length of stay. Efforts are underway to define barriers to deimplementation and optimize a strategic approach. These efforts may also lessen alarm fatigue. Parents may sleep better, and infants will be less encumbered by monitoring devices.

A reasonable initial approach to the problem of overdiagnosis is to just stop testing. If a test doesn’t improve outcomes and may cause harm, then why use the test? However, few would advocate for complete abandonment of pulse oximetry in the evaluation and management of patients with bronchiolitis. There may be a role for the technology as a triage tool and as a monitoring device for patients at risk for apnea and those receiving respiratory support. Even for those infants who successfully wean off of supplemental oxygen, intermittent pulse oximetry is still recommended (although there is no evidence that intermittently measuring pulse oximetry is superior to not measuring it at all for this population of stable infants soon to be discharged home).

Understandably, then, parents may be confused. They may be told on the day of admission that their baby is being hospitalized because the oxygen saturation is 86%, and may naturally wonder 2 days later why the machine is being removed. An honest response to this concern would include mention that the machine might detect low saturations (eg, 86%), and team members would then feel obliged to intervene even though these desaturations are not known to be harmful in this context. By simply removing the pulse oximeter, we neglect to address a fundamental problem, namely, our tendency to overreact to minor deviations from normal. Ideally, as we move forward with deimplementation of pulse oximetry, we will also address why we feel beholden to lower limit saturation thresholds in our management of bronchiolitis.

Thanks to rigorous clinical research, national guidelines, and local and multicenter quality improvement efforts, value appears to have improved substantially in bronchiolitis care. However, even in 2019, nonrecommended therapies continue to be provided at high rates, with bronchodilators, steroids, and antibiotics being used in 50%, 18%, and 24%, respectively, of patients admitted to children’s hospitals.2 Additionally, unanswered questions remain surrounding the appropriate use of regular and high-flow oxygen, saturation thresholds (lower and/or upper limit), and oxygen saturation monitoring. We can celebrate that progress has been made around health care value in bronchiolitis, but there is still plenty of work left to do.
REFERENCES


