ADAPTATION OF CARE ESCALATION MODEL FOR SEVERITY OF ILLNESS

Severity of illness might confound any association between day of illness and outcomes in bronchiolitis hospitalizations (ie, practitioners might factor day of illness into their decision to admit to the hospital). Bronchiolitis investigations have used variable approaches to control for severity of illness. Some researchers have used respiratory scores; however, scores were used and documented too inconsistently at participating sites in our study to enable this approach. Additionally, these scores generally do not include important factors that influence severity, such as age, dehydration, or apnea. Others have used All Patient Refined Diagnosis Related Groups, but these may be impacted by the outcomes (ie, ICU stay, use of PPV) that we intended to measure.

No measure of severity of illness was included in either of the 2 original studies used to supply data for this investigation. Therefore, to assess for a potential association between day of illness and severity of illness, we adapted a scoring tool used by Freire et al to predict escalated care in bronchiolitis in the ED setting. This tool, which was initially derived retrospectively, incorporates 7 clinical variables: age <2 months (1 point), oxygen saturation <90% (5 points), poor feeding (1 point), retractions (2 points), nasal flaring and grunting (2 points), apnea (2 points), and dehydration (1 point). The tool has an area under the curve of 0.85 for escalation of care, defined as use of HFNC, noninvasive or invasive ventilation, or ICU admission.

We applied this tool to a random sample of 100 patients from the RCT who underwent another chart review solely for this purpose. We used hospitalist admission notes to extract data, supplemented by ED or urgent care notes when necessary, and evaluated the period of time between initial presentation to the ED and admission to the hospital. Each chart was reviewed independently by 2 investigators to assess interrater reliability using intraclass coefficients (ICCs). To account for clustering, with raters nested within hospital and patients nested within raters, the ICC was computed by using a mixed effects multilevel linear regression, with both rater and hospital treated as a random effect, and an ICC was computed for both hospitals and raters. The ICC (95% CI) for the total score for the 100 patient sample was 0.85 (0.78 to 0.9), indicating excellent agreement.

Although there was no association between this total score and care escalation in our sample (odds ratio: 1.1, 95% CI: 0.9 to 1.2), there was a strong association when oxygen saturation was removed from the score (odds ratio: 1.7 for each additional point on the severity score, 95% CI: 1.2 to 2.3), indicating that the remaining 6 components of the score were reasonable measures of severity of illness in our sample. The improved performance once oxygen saturation was removed is likely explained by the fact that we analyzed the entire time period between ED presentation and hospital admission, thereby increasing the probability of detecting inconsequential episodes of hypoxemia, which are common in bronchiolitis. By using these 6 measures, the median (IQR) severity score was 4 (3–5) and did not differ across participating hospitals (P = .6 by using a Kruskal–Wallis test).

Using the score from these 6 measures, we found no association between day of illness on admission and severity of illness (correlation coefficient: −.01, P = .91) in our sample of 100 patients. For this reason, we opted not to include severity of illness as a covariate.