Decreasing Bronchodilator Utilization for Acute Viral Bronchiolitis with a Respiratory Score in the AAP-VIP Network Bronchiolitis Collaborative

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Background
- Bronchodilators do not improve outcomes or affect length of hospital stay for patients with bronchiolitis
- Inpatient bronchodilator usage varies widely between hospitals
- Respiratory scores have been shown to decrease bronchodilator utilization
- A 3-4 element respiratory score can be used to assess response to an intervention such as a bronchodilator trial
- Use of scores to decrease utilization has not been evaluated outside of large, freestanding children’s hospitals

Specific Aims
- Achieve 90% implementation of a respiratory score for patients admitted with bronchiolitis
- Decrease bronchodilator usage by 50%

Methods

Setting
- The Value in Inpatient Pediatrics (VIP) Network Quality Collaborative for Improving Hospitalist Compliance with the AAP Bronchiolitis Guideline (B-QIP) was created in 2012 to improve bronchiolitis care through quality improvement (QI) education and tools specific to bronchiolitis

Planning the Study of the Intervention
- 12 community hospitals and 10 university hospitals participated
- For each cycle, a standard sample size of 20 charts was reviewed by each site team to compute monthly utilization rates and data were uploaded centralized online data repository
- Data were fed back to sites using simple run charts in real time comparing site performance to group mean performance

Method of Evaluation and Analysis
- Pre-intervention data were collected for Jan-Mar 2013 (cycles 1–3)
- Post-intervention data were collected for Jan-Mar 2014 (cycles 4-6)
- Comparison of pre- and post-intervention data was by chi-square for categorical variables and two-tailed t-test for doses per patient.
- Individual cycle results were compared to the overall group mean by Analysis of Means (ANOM)
- Achievable benchmarks of care (ABCs) were calculated for each measure

Planning the Intervention
- An multispecialty expert committee was formed comprised of emergency medicine, intensive care, hospital medicine, and community pediatric physicians
- The expert committee met prior to the start of the project to set criteria for site recruitment, propose areas of improvement, and design metrics
- Sites would be selected with preference for community setting, more than 50 bronchiolitis admissions per year, and some QI experience
- Improvement target: bronchodilator usage

Results

Table 1: Unadjusted Pre-Post Analysis showing improvement in the three outcome measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>Before (n=1028)</th>
<th>After (n=884)</th>
<th>p-value</th>
<th>ABC benchmark (top 10%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients assessed by score</td>
<td>22%</td>
<td>63%</td>
<td>&lt;0.001</td>
<td>97%</td>
</tr>
<tr>
<td>Bronchodilator use after admission</td>
<td>47%</td>
<td>31%</td>
<td>&lt;0.001</td>
<td>10%</td>
</tr>
<tr>
<td>Bronchodilator doses per patient</td>
<td>3.9</td>
<td>1.7</td>
<td>&lt;0.001</td>
<td>1</td>
</tr>
</tbody>
</table>

Figure 2: Percent of bronchiolitis patients assessed by respiratory score by cycle demonstrating change after the intervention period

Figure 3: Percent of patients with bronchodilator use after admission by cycle demonstrating change after the intervention period

Figure 4: Pre/post change in bronchodilator usage arranged by site

Limitations
- Our study included only a small number of data points limiting our analysis of secular trends
- We were unable to control for clustering at the institutional level through use of the analysis of means
- We were unable to prospectively measure the effect of specific interventions implemented at each site

Conclusions
- Implementation of a respiratory scoring system for acute viral bronchiolitis is practical in a diverse improvement collaborative including both academic and community hospital settings.
- Respiratory scoring is a useful tool for decreasing utilization of bronchodilators for patients admitted with acute viral bronchiolitis.

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