Implementation of an Evidence-Based Care Guideline for Inpatient Bronchiolitis Management

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Bronchiolitis is a serious viral lower respiratory tract infection which is the most common reason for child hospitalization under 1 year of age.

Bronchiolitis is a seasonal epidemic disease which places major stresses on pediatric hospital capacity each winter season.
There are few evidence-based medical interventions for bronchiolitis; however, utilization of non-evidence based therapies is quite high in many clinical settings resulting in increased cost and length of stay.

Evidence-based guidelines for bronchiolitis care are available from the American Academy of Pediatrics and the Agency for Healthcare Research and Quality.
Commonly used therapies for bronchiolitis which are not evidence-based

- Albuterol
- Steroids
- Chest physiotherapy
- Antibiotics
Our aim was to reduce the usage of non-evidence based medical therapy for bronchiolitis by 50% on the 3rd and 9th floors of Christus Santa Rosa Children’s Hospital from 12/15/2008 to 3/15/2009 using a protocol order set and respiratory therapist driven scoring system.
Bronchiolitis Care at Christus Santa Rosa Children’s (pre-intervention)

- Baseline data was collected on a sample of 100 patients with a primary diagnosis of bronchiolitis admitted to CSR Children’s between 10/2007 and 3/2008 out of a total population of 545 children admitted with the diagnosis during the winter season.

- Rates of non-evidence-based therapy usage were extracted by chart review.

- Ideally, rates of each of the targeted therapies should approach zero.
### Rates of Non-Evidence-Based Therapy Usage

<table>
<thead>
<tr>
<th>Therapy</th>
<th>2007-2008 CSR Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albuterol</td>
<td>89%</td>
</tr>
<tr>
<td>Steroids</td>
<td>33%</td>
</tr>
<tr>
<td>Chest Physiotherapy</td>
<td>22%</td>
</tr>
<tr>
<td>Antibiotics</td>
<td>63%</td>
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</tbody>
</table>
Process Analysis - Fishbone

WHY DO WE OVERUTILIZE??

MD
- Not aware of evidence
- Frustration that no other therapy exists
- Experience/Habit
  - Pressure to continue as per ER or PCP

RN
- Frustration at doing nothing
- Experience/Habit
  - Need to provide bed assignment/infection control
  - Perceived patient deterioration

PARENT
- Desire for relief for child and "CURE"
- Belief that MD/RN should do something
- Expectations

RESP THERAPIST
- Need to do something when called
- Variability in skills
  - Changing clinical status
  - Variability in training

PATIENT
- Wrong Diagnosis: may have asthma

Utilization of non-evidence-based treatment for Bronchiolitis
Process Analysis - Flowchart

Pt comes to ER → Seen by MD → Makes Diagnosis →

- Clinical picture
- Orders CXR
- Orders RSV Testing

→ Bronchiolitis?
  → Asthma
  → Treatment
    ← Trial of beta agonist
    → Poor reassessment
      ← VIQ Mismatch/Hypoxia
        → No: discharge
          → Admit patient
            ← Resident called
              → Continue ER management
                ← Diagnosis: Bronchiolitis
                  ← Assesses patient
                    → Increased use of non evidence-based treatment
                      → Increased LOS
                        → Patient Discharged?
          → Reads CXR
            → Overcalls Pneumonia

Intervention

- Evidence-based order set developed based on Cincinnati Children’s published orders but also incorporating new evidence

- Respiratory therapist driven scoring tool for bronchiolitis also adapted from CHMCC chosen

- Parent handout created specific to our project
1. Admission: □ Admit to ______ (nursing unit); Team: _______ Attending M.D. ___________
   □ Full admission □ 23 hour Observation (patient expected to stay 23 hrs or less) □ Droplet and Contact Precautions

2. Diagnosis: Bronchiolitis

3. Vitals/Monitoring: Every 4 hours with pulse oximetry spot checks, BP once daily unless otherwise specified.
   □ Continuous pulse oximetry (consider for patients under 60 days of age)

4. Oxygen therapy: O2 per nasal cannula to keep saturation >90%, wean as tolerated.

5. Activity: □ As tolerated □ Other (specify) __________

6. Diet: □ Regular □ Other (specify): __________

7. IV: □ None
   □ D5 ½ NS with 20 mEq KCl per liter at ________ ml/hr
   □ Saline lock
   □ Other (specify): ______________ at ___________ ml/hr

8. Suction nares externally using white, mushroom tip suction catheter. Reserve deep suctioning for patients who fail to respond to external suctioning.

9. Initiate Respiratory Therapy Bronchiolitis Protocol:
   a) Pediatric Bronchiolitis Score after nasal suctioning every 4 hrs.
   b) 3% saline - 4ccs nebulized every 4 hrs if respiratory score > 3
   c) Racemic epinephrine nebulized 5 mg/dose prn respiratory score > 3 and failure to improve with 3% saline.

10. Notify House Officer for:
   □ New temperature ≥ 38 C (100.4 F)
   □ Respiratory Rate > __________
   □ Heart Rate > _______________
   □ Oxygen requirement > _______________
   □ Respiratory Score ≥ 6 after suctioning and treatment

11. Other Medications
   □ Tylenol 15 mg/kg p.o. every four hours as needed for fever or pain, dose________________

12. Patient Education: Please provide parent with Bronchiolitis handout and instruct in external nasal suctioning.


14. Other Orders: ________________________________
Intervention – Modified Cincinnati Score

**Respiratory Rate**
- 0) Normal
- 1) Above Tachypnea Threshold (infant greater than 50 when not crying or agitated)

**Accessory Muscles**
- 0) Normal
- 1) Moderate Retractions
- 2) Severe Retractions

**Air Exchange**
- 0) Normal
- 1) Localized Decreased
- 2) Multi Area Decreased

**Wheeze**
- 0) None/ End Expiratory
- 1) Entire Expiratory
- 2) Entire Expiration and Inhalation

*3% saline nebulization given for score >3 and racemic epinephrine given for score ≥6, max score is 7*
RESULTS
Pre and Post-Intervention Usage of Targeted Therapies

![Graph showing usage of targeted therapies pre and post intervention.]

- **Intervention** indicated by a vertical line around December 2008.
- Therapies: Albuterol, Steroids, CPT, Abx.

### Therapies
- **Albuterol**: Steady decrease post-intervention, remaining below 10 by February 2009.
- **Steroids**: Peaks in January 2008, then decreases post-intervention.
- **CPT**: Consistent usage with minor fluctuations post-intervention.
- **Abx**: Minimal usage throughout, remains around 10 after intervention.

### Timeline
- **Dec-07 to Feb-09**: Graph spans from December 2007 to February 2009.
- **Y-axis**: 0 to 100, representing usage levels.

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### Notes
- The graph illustrates the impact of an intervention on the usage of targeted therapies.
- Usage trends post-intervention suggest potential effectiveness in reducing reliance on certain therapies.
## Results

<table>
<thead>
<tr>
<th>Targeted Therapy</th>
<th>Pre-Intervention (n=100)</th>
<th>Post-intervention (n= 43)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albuterol</td>
<td>89%</td>
<td>12%</td>
</tr>
<tr>
<td>Steroids</td>
<td>33%</td>
<td>5%</td>
</tr>
<tr>
<td>Chest Physiotherapy</td>
<td>22%</td>
<td>2%</td>
</tr>
<tr>
<td>Antibiotics</td>
<td>63%</td>
<td>16%</td>
</tr>
</tbody>
</table>
## Results

<table>
<thead>
<tr>
<th></th>
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<th>Post-Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALOS</td>
<td>3.5</td>
<td>2.2</td>
</tr>
</tbody>
</table>
Results

- The protocol was used for 43 patients, representing 70% of eligible admissions during the pilot period.

- Length of stay decreased by over one day.

- Estimated cost savings were $1564 per case for over $67,000 in savings for the 90 day project.

- No protocol patient suffered any significant adverse event, required ICU transfer, or was readmitted.
Future of the Project

- Finalize the order set and scoring system (currently on version 3.0)
- Expand utilization to other floors in CSR Children’s
- Expand program to address problems of overutilization in the Emergency Department