Evaluating a Pediatric Emergency Department Intervention: Promotion of a Standard Practice Change from Salbutamol by Nebulization to Metered-dose Inhalers with Holding Chambers

Co-Investigators:
KF Hurley, MD, I Sketris, PharmD, MPA (HSA), C O’Connell, PhD, D Sinclair, MD, A Wing, BSc

Presentation:
B Hill-Taylor, BSP, MLIS Candidate
April, 2011
Evaluating a Pediatric Emergency Department Intervention: Promotion of a Standard Practice Change from Salbutamol by Nebulization to Metered-dose Inhalers with Holding Chambers

• Issue
• Methodology
• Results
• Recommendations

Image from foodasmedicine.blogspot.com
Asthma affects >15% of Canadian children

Patients with wheeze-related illness represent 7% of IWK Emergency presentations

Salbutamol is prescribed for 1300 - 1600 patients per year at IWK Emergency

Traditionally, salbutamol is administered by nebulization

1. Preliminary results Wing, 2010
Benefits of salbutamol administration via metered-dose Inhalers with holding chambers versus nebulization

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Patients &amp; Families</th>
<th>Emergency Department</th>
<th>Healthcare System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced side effects</td>
<td></td>
<td>Quieter (^3)</td>
<td>Reduced cost for medication and medical devices (^1,4,6)</td>
</tr>
<tr>
<td>Reduced morbidity (^6)</td>
<td></td>
<td>Reduced risk of cross infection (^7,8,9)</td>
<td>Reduced staffing costs (^2,10,11)</td>
</tr>
<tr>
<td>Reduced administration time (^1,2,6)</td>
<td></td>
<td>Reduced time in department (^1)</td>
<td>Reduced morbidity/potentially reduced admissions (^6,12)</td>
</tr>
<tr>
<td>Reduced time and risk in maintenance in the community (^4,6)</td>
<td></td>
<td>Valuable opportunity for teaching and reinforcement (^6,8,14)</td>
<td>Increased staff satisfaction (^18)</td>
</tr>
<tr>
<td>Better acceptance by patient &amp; family (^8,12,16)</td>
<td></td>
<td></td>
<td>Potential to use homemade or plastic water bottle as holding chamber (^15)</td>
</tr>
<tr>
<td>Portable (^17)</td>
<td></td>
<td></td>
<td>Electricity/Compressed air not needed (^13)</td>
</tr>
<tr>
<td>Usually easier to administer (^5,6)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The Issue (con’t)

- Optimal route for most children with acute asthma is metered-dose inhalers with holding chambers

- Surveys in Canada, US, UK, Australia and Europe: Nebulization remains most used method

- 2006: Dr. K. Hurley et al studied the barriers to adopting best practices

- 2007-2008: Clinical practice intervention

- Summer 2010: Evaluation

Methodology

- Research Ethics Board approval
- Key informant interviews & departmental record review
- Hospital Data
  - Pharmacy inventory data ¹
  - Number & severity of patients with wheeze related illness ²
- Design/Analysis
  - Retrospective interrupted time series with segmented regression analysis ³

¹ Department of Pharmacy, IWK Hospital ² IWK Decision Support Database ³ Statistical results are being finalized
# Timeline

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td><em>Barriers to metered-dose inhaler/spacer use in Canadian pediatric emergency departments: A national survey</em>&lt;sup&gt;4&lt;/sup&gt;</td>
<td>3. Cates et al. 2006 (Adults and Children &gt; 2 yrs)</td>
</tr>
<tr>
<td>2006</td>
<td><em>Holding chambers (spacers) vs nebulisers for beta-agonist treatment of acute asthma</em>&lt;sup&gt;3&lt;/sup&gt; (published updated Cochrane review)</td>
<td>4. Osmond et al., 2006</td>
</tr>
<tr>
<td>Nov 8 2006</td>
<td>K. Hurley presents ‘Barriers’ research project&lt;sup&gt;2&lt;/sup&gt; to IWK emergency pediatricians, Medical Chief presents draft action plan</td>
<td></td>
</tr>
<tr>
<td>Nov 21 2007</td>
<td>Focus groups and educational session</td>
<td></td>
</tr>
<tr>
<td>Jan 16 2008</td>
<td>Asthma care map posted in ED</td>
<td></td>
</tr>
<tr>
<td>Sept 3 2008</td>
<td>Plan reinforced in ED</td>
<td></td>
</tr>
<tr>
<td>Nov 27 2008</td>
<td>Asthma care map finalized</td>
<td></td>
</tr>
<tr>
<td>Dec 15 2008</td>
<td>Public service announcement Halifax Regional Municipality by radio</td>
<td></td>
</tr>
<tr>
<td>June 2009</td>
<td>Asthma care map approved as permanent record in patient chart</td>
<td></td>
</tr>
</tbody>
</table>
Delivery of Salbutamol Metered-dose Inhalers and Nebulization Solution from Jan 1, 2003 - May 31, 2010 to the IWK ED

Asthma Care Map adopted January 2008
Delivery of Salbutamol Metered-dose Inhalers and Nebulization Solution from Jan 1, 2003 - May 31, 2010 to the IWK ED

Proportion of Salbutamol Delivered by Meter-Dose Inhalers

Weeks
Key Attributes for Innovation Adoption

• Simplicity

• Trialability

• Observability

• Reinvention (flexibility)

• Risk (evidence, culture)

• Responsibility for quality improvement in the hands of frontline staff

• Collective team responsibility (lead by key champions)

• Quality improvement (evidence-based & patient oriented)

• Ganz et al, 2009, Image from halton.ca
Consequences of Intervention

• Metered-dose inhaler use increased significantly

• Emergency department is a quieter place to work, with less patient distress

• Cultural shift in clinical practice occurred

• Diffusion of changed practice - impact on training health care professionals including > 100 medical students, fellows, and residents annually

• Further study needed to document:
  • Reduced time in department
  • Cost savings?

1. Personal correspondence with Dr. S. Swartz & Dr. S. MacPhee
Consequences of Intervention

• An associated absolute drop of 7.25% (or approx 30% relative) in admission rates for wheezy patients

• Asthma Care Map obviously contributes
Recommendations

- Revise the Asthma Care Map to reflect practice change, **metered-dose inhalers with holding chambers** preferred route for most children

- Conduct an economic evaluation

- Encourage other NS acute care hospitals to adopt intervention
Acknowledgements

• I would like to acknowledge the assistance and advice of Dr. Sketris, Dr. Hurley, Ethel Langille Ingram, Dr. Spiteri, Dr. O’Connell, Dr. Sinclair, Andrew Wing, and the many staff members of the IWK Health Center and IWK Decision Support who helped me with this project.

• This project builds on the work of K Hurley, MD, J Sargeant, PhD, J Duffy, PhD, I Sketris, PharmD, MPA (HSA), D Sinclair, MS, and J Ducharme, MD.

• Dr. Ingrid Sketris holds a Chair funded by the Canadian Health Services Research Foundation/ Canadian Institute of Health Research, and co-sponsored by the Nova Scotia Health Research Foundation. This residency project is funded by the Drug Use Management and Policy Residency program, which is supported by the above organizations.

• The opinions, views and major findings from this project are those of the primary author and do not represent the views of the IWK Emergency Department.
Questions?
Strengths & Limitations

• Study design

• Ward stocking change

• Use of patients’ own medications and holding chambers

• External factors

• Quality of the databases

• Data obtained from the structured interviews was subject to memory and bias.