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

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Presentation:
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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
### Issue

- 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

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

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

The Issue (con’t)

• Optimal route for most children with acute asthma is metered-dose inhalers with holding chambers ¹

• Surveys in Canada, US, UK, Australia and Europe: Nebulization remains most used method ²

• 2006: Dr. K. Hurley et al studied the barriers to adopting best practices ³

• 2007-2008: Clinical practice intervention

• Summer 2010: Evaluation

1. Cates, Crilly & Rowe 2009; Kaashmiri 2010; Motala 2009,
# Methodology

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

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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>
</tr>
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<tbody>
<tr>
<td>2003</td>
<td>Holding chambers versus nebulisers for beta-agonist treatment of acute asthma (^1) (published updated Cochrane review)</td>
</tr>
<tr>
<td>2005</td>
<td>Canadian Pediatric Asthma Consensus Guidelines (published)</td>
</tr>
<tr>
<td>2006</td>
<td>Barriers to metered-dose inhaler/spacer use in Canadian pediatric emergency departments: A national survey (^4)</td>
</tr>
<tr>
<td>Nov 8 2006</td>
<td>K. Hurley presents ‘Barriers’ research project(^2) to IWK emergency pediatricians, Medical Chief presents draft action plan</td>
</tr>
<tr>
<td>2006</td>
<td>Holding chambers (spacers) vs nebulisers for beta-agonist treatment of acute asthma (^3) (published updated Cochrane review)</td>
</tr>
<tr>
<td>Nov 21 2007</td>
<td>Focus groups and educational session</td>
</tr>
<tr>
<td>Jan 16 2008</td>
<td>Asthma care map posted in ED</td>
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<tr>
<td>Sept 3 2008</td>
<td>Plan reinforced in ED</td>
</tr>
<tr>
<td>Nov 27 2008</td>
<td>Asthma care map finalized</td>
</tr>
<tr>
<td>Dec 15 2008</td>
<td>Public service announcement Halifax Regional Municipality by radio</td>
</tr>
<tr>
<td>June 2009</td>
<td>Asthma care map approved as permanent record in patient chart</td>
</tr>
</tbody>
</table>

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3. Cates et al, 2006 (Adults and Children >2 yrs)  
4. Osmond et al., 2006
Delivery of Salbutamol Metered-dose Inhalers and Nebulization Solution from Jan 1, 2003 - May 31, 2010 to the IWK ED
Delivery of Salbutamol Metered-dose Inhalers and Nebulization Solution from Jan 1, 2003 - May 31, 2010 to the IWK ED
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

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- 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.

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- 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?

Wordle http://www.wordle.net/
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.