Knowledge Translation and Emergency Medicine

Eddy Lang
Jeremy Grimshaw
Michael Brown
Knowledge Translation

The exchange, synthesis and application of research evidence within a complex system of relationships among researchers and knowledge users.
Available evidence

Evidence that gets incorporated into practice
Myth, opinion, poor research

2. Bedside EBM
Aware, Accepted, Applicable, Able, Acted on, Agreed, Adhered to

3. Clinical Quality Improvement

4. Decision Aids, Patient Education, Compliance aids

Glasziou P, Haynes B.
Dr. Eddy Lang

- Assistant Professor McGill University
- EBM undergraduate director
- Workshop director
- EBM Series Annals
Dr. Jeremy Grimshaw

- Director of the Clinical Epidemiology Program of the Ottawa Health Research Institute
- Canada Research Chair in Health Knowledge Transfer and Uptake
- Co-coordinating editor of the Cochrane Effective Practice and Organization of Care review group EBM Series Annals
- KT expert in EM research on uptake of decision rules and croup guidelines
Dr. Michael Brown

- Associate Professor of Emergency Medicine and Epidemiology Michigan State University
- Chair SAEM EBM IG
- EBM Series Annals
- KT research VTE
Scenario Phase I

- 43 year old female presents to the with dyspnea and cough that she attributes to asthma
- Picked up her daughter’s URI
- Can’t sleep (presents at 2:00am)
- Asthma has been quiescent for months no ED visits for over a year
- Multiple admissions in her 30’s
Scenario Phase I

- Salbutamol at home only, seems to have emptied canister
- No fever, chest pain, chills
- ROS and other PMHx unremarkable
- Anxious and dyspneic on exam
- RR = 30, incessant coughing, Sat 98%
- Diminished air entry bilaterally
- Prolonged expiratory phase and wheezing
  ++
ED Care

- FEV$_{1.0}$ = 50% predicted / Normal CXR
- Aerosolized salbutamol 2.5mg Q1h x 3 then Q2h
- Prednisone 50mg PO
- Gradual improvement over 6-hour stay in the ED
- Discharge on 5-day course of prednisone and renewed Rx for salbutamol
Questions to consider

1. Was the patient’s management reasonable?
2. Could this case management have occurred in a North American ED?
3. What critiques would you provide of the management provided for this patient?
Scenario Phase II

- Patient returns 3 days later in severe respiratory distress
- While generally mild allergic symptoms to cats now very SOB after accidental exposure
- Had been doing reasonably well on exit Rx
- No chest pain / no fever
Scenario Phase II

- Appears pale, HR = 130, BP 160/95, RR = 40, Sat 85% (R/A)
- Patient appears pale, barely able to speak 3 words in succession
- Marked accessory muscle use
- Markedly decreased air entry, minimal wheezing
ED Care

- Q15 minute aerosols x 2 (salbutamol 5.0mg) then q30 min
- 120 mg methylprednisolone IV
- Heliox and non-invasive positive pressure ventilation – doesn’t seem to help
- Minimal improvement over 4-hour stay in the ED
- Transfer to ICU
Questions to consider

1. Was the patient’s management reasonable?
2. Could this case management have occurred in a North American ED?
3. What critiques would you provide of the management provided for this patient?
ED Care (Phase I)

- $\text{FEV}_{1.0} = 50\%$ predicted / Normal CXR
- **Aerosolized salbutamol 2.5mg Q1h x 3** then Q2h
- Prednisone 50mg PO
- Gradual improvement over 6-hour stay in the ED
- Discharge on 5-day course of prednisone and renewed Rx for salbutamol
### Holding chambers versus nebulisers for beta-agonist treatment of acute asthma

Cates CCJ, Bara A, Crilly JA, Rowe BH. Cochrane Library March 2003

<table>
<thead>
<tr>
<th>Study</th>
<th>Holding Chamber n/N</th>
<th>Nebuliser n/N</th>
<th>Relative Risk (Fixed)</th>
<th>Weight (%)</th>
<th>Relative Risk (Fixed)</th>
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<td><strong>01 Adults</strong></td>
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<td>1/20</td>
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<td>1.33 [0.09, 19.64]</td>
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<td>Raimondi 1997</td>
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<td>Rodrigo 1993</td>
<td>5/49</td>
<td>4/48</td>
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<tr>
<td>Rodriguez 1999</td>
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<td>17/33</td>
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<td>26.4</td>
<td>0.75 [0.45, 1.28]</td>
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<tr>
<td>Turner 1988</td>
<td>4/27</td>
<td>5/26</td>
<td></td>
<td>7.6</td>
<td>0.77 [0.23, 2.56]</td>
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<tr>
<td><strong>Subtotal</strong></td>
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<td>27/176</td>
<td></td>
<td>42.0</td>
<td>0.88 [0.56, 1.38]</td>
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</tbody>
</table>

- Test for heterogeneity chi-square=1.31 df=4 p=0.8594
- Test for overall effect=-0.55 p=0.6

| **02 Children**|                      |               |                       |            |                       |
| Batra 1997     | 7/30                 | 6/30          |                       | 8.9        | 1.17 [0.44, 3.07]     |
| Chou 1995      | 4/71                 | 5/81          |                       | 6.9        | 0.91 [0.25, 3.27]     |
| Leversha 2000  | 10/30                | 18/30         |                       | 26.8       | 0.56 [0.31, 1.00]     |
| Ploin 2000     | 3/31                 | 3/32          |                       | 4.4        | 1.03 [0.23, 4.73]     |
| Valencia 1999  | 7/32                 | 5/38          |                       | 6.8        | 1.66 [0.58, 4.74]     |
| Vazquez 1992   | 0/9                  | 0/9           |                       | 0.0        | Not estimable         |
| Williams 1996  | 2/42                 | 2/18          |                       | 4.2        | 0.43 [0.07, 2.81]     |
| **Subtotal**   | 33/246               | 39/238        |                       | 58.0       | 0.85 [0.57, 1.26]     |

- Test for heterogeneity chi-square=4.61 df=6 p=0.4658
- Test for overall effect=-0.81 p=0.4

| **Total**     |                      |               |                       |            |                       |
| 58/421        | 66/414               |               |                       | 100.0      | 0.86 [0.64, 1.16]     |

- Test for heterogeneity chi-square=5.93 df=10 p=0.8209
- Test for overall effect=-0.97 p=0.3
Nebulizers Versus Inhalers With Spacers for Acute Asthma

**EBEM Commentator**

**Barry Diner, MD, MSc (Candidate)**

*From the Department of Emergency Medicine, Emory University, Atlanta, GA.*


**SYSTEMATIC REVIEW SOURCE**

This is a systematic review abstract, a regular feature of the *Annals' Evidence-Based Emergency Medicine* (EBEM) series. Each features an abstract of a systematic review from the Cochrane Database of Systematic Reviews and a commentary by an emergency physician knowledgeable in the subject area.


The *Annals' EBEM* editors helped prepare the abstract of this Cochrane systematic review as well as the Evidence-Based Medicine Teaching Points.

**OBJECTIVE**

A systematic review was conducted to determine the effectiveness of holding chambers versus nebulisers for beta-agonist delivery in the treatment of acute asthma. The review considered randomized controlled trials in adults and/or children aged ≥2 years with acute asthma, where holding chamber β₂-agonist delivery was compared with wet nebulization, were selected. This report will focus on the results from adult studies only.

**STUDY SELECTION**

Randomized controlled trials in adults and/or children aged ≥2 years with acute asthma, where holding chamber β₂-agonist delivery was compared with wet nebulization, were selected. This report will focus on the results from adult studies only.

**DATA EXTRACTION AND ANALYSES**

Two reviewers independently selected articles for inclusion, evaluated methodological quality of the studies, and abstracted the data. Continuous variables were reported as weighted mean difference, and dichotomous variables were reported as relative risk (RR), both with associated 95% confidence intervals (CIs).

**MAIN RESULTS**

This review has been updated in 2003 and has now analyzed 1,076 children and 444 adults included in 22 trials from emergency department (ED) and community settings. In addition, 5 trials on inpatients with acute asthma (184 children and 28 adults) have been added to the review. Method of delivery of β₂-agonist did not appear to affect hospital admission rates. In adults, the relative risk of admission for holding chamber versus nebulizer was 0.88 (95% CI 0.56 to 1.39).
ED Care (Phase I)

- $FEV_{1.0} = 50\%$ predicted / Normal CXR
- Aerosolized salbutamol 2.5mg Q1h x 3 then Q2h
- Prednisone 50mg PO
- Gradual improvement over 6-hour stay in the ED
- Discharge on 5-day course of prednisone and renewed Rx for salbutamol

? inhaled corticosteroids in the ED
Early use of inhaled corticosteroids in the emergency department treatment of acute asthma

Edmonds ML, Camargo CA Jr, Pollack CV Jr, Rowe BH. Cochrane library may 2003

<table>
<thead>
<tr>
<th>Study</th>
<th>Treatment n/N</th>
<th>Control n/N</th>
<th>Odds Ratio (Fixed) 95% CI</th>
<th>Weight (%)</th>
<th>Odds Ratio (Fixed) 95% CI</th>
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<tbody>
<tr>
<td>01 ICS+systemic corticosteroids vs systemic corticosteroids</td>
<td>Guttmann 1997</td>
<td>8 / 30</td>
<td>12 / 30</td>
<td>23.8</td>
<td>0.55 [0.18, 1.62]</td>
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<td></td>
<td>Sung 1998</td>
<td>2 / 24</td>
<td>5 / 20</td>
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<td>17 / 50</td>
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<tr>
<td>02 ICS vs placebo</td>
<td>Afilalo 1999</td>
<td>2 / 28</td>
<td>5 / 26</td>
<td>13.0</td>
<td>0.32 [0.06, 1.84]</td>
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<td></td>
<td>Rodrigo 1998</td>
<td>4 / 47</td>
<td>12 / 47</td>
<td>29.7</td>
<td>0.27 [0.08, 0.92]</td>
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<td></td>
<td>Singhi 1999</td>
<td>0 / 30</td>
<td>7 / 30</td>
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<td>Test for overall effect=-3.32 p=0.0009</td>
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<td>Total (95% CI)</td>
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<td>16 / 159</td>
<td>41 / 153</td>
<td>100.0</td>
<td>0.30 [0.16, 0.57]</td>
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<td>Test for overall effect=-3.69 p=0.0002</td>
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NNT = 6
ED Care (Phase I)

- FEV$_{1.0}$ = 50% predicted / Normal CXR
- Aerosolized salbutamol 2.5mg Q1h x 3 then Q2h
- Prednisone 50mg PO

Gradual improvement over 6-hour stay in the ED

Discharge on 5-day course of prednisone and renewed Rx for salbutamol

? inhaled corticosteroids

? what about inhaled corticosteroids
Inhaled steroids for acute asthma following emergency department discharge

Edmonds ML, Camargo CA Jr, Brenner BE, Rowe BH. Cochrane Library May 2003

<table>
<thead>
<tr>
<th>Study</th>
<th>ICS + Oral CS n/N</th>
<th>Oral CS n/N</th>
<th>Odds Ratio (Fixed) 95% CI</th>
<th>Weight (%)</th>
<th>Odds Ratio (Fixed) 95% CI</th>
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<tr>
<td>Brenner 2000</td>
<td>3/51</td>
<td>3/53</td>
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<td>5.4</td>
<td>1.04 [0.20, 5.42]</td>
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<td>Camargo 2000</td>
<td>29/310</td>
<td>37/307</td>
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<td>65.5</td>
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<tr>
<td>Rowe 1999</td>
<td>11/94</td>
<td>17/94</td>
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<td>29.2</td>
<td>0.60 [0.26, 1.36]</td>
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<td>Total (95% CI)</td>
<td>43/455</td>
<td>57/454</td>
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<td>100.0</td>
<td>0.72 [0.48, 1.10]</td>
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Test for heterogeneity chi-square=0.41 df=2 p=0.8144
Test for overall effect=-1.51 p=0.13

NNT = 30
ED Care (Phase II)

- Q15 minute aerosols x 2 (salbutamol 5.0mg) then q30 min
- 120 mg methylprednisolone IV
- Heliox and non-invasive positive pressure ventilation – doesn’t seem to help
- Minimal improvement over 4-hour stay in the ED
- Transfer to ICU
Continuous versus intermittent beta-agonists for acute asthma
Camargo CA Jr, Spooner CH, Rowe BH. The Cochrane Library July 2003

NNT = 13
ED Care (Phase II)

- Q15 minute aerosols x 2 (salbutamol 5.0mg) then q30 min
- 120 mg methylprednisolone IV
- Heliox and non-invasive positive pressure ventilation – doesn’t seem to help
- Minimal improvement over 4-hour stay in the ED
- Transfer to ICU
Review: Heliox for nonintubated acute asthma patients
Comparison: 02 Heliox therapy vs control (Other outcomes)
Outcome: 04 Hospital admissions

<table>
<thead>
<tr>
<th>Study</th>
<th>Treatment n/N</th>
<th>Control n/N</th>
<th>Relative Risk (Random) 95% CI</th>
<th>Weight (%)</th>
<th>Relative Risk (Random) 95% CI</th>
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<tr>
<td>Dorfman 2000</td>
<td>5 / 20</td>
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<td>3.9</td>
<td>10.48 [0.62, 177.45]</td>
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<td>Henderson 1999</td>
<td>5 / 102</td>
<td>8 / 102</td>
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<td>23.0</td>
<td>0.63 [0.21, 1.85]</td>
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<tr>
<td>Kress 2002</td>
<td>6 / 23</td>
<td>6 / 22</td>
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<td>27.6</td>
<td>0.96 [0.36, 2.52]</td>
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<tr>
<td>Rose 2002</td>
<td>9 / 18</td>
<td>8 / 18</td>
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<td>46.5</td>
<td>1.13 [0.56, 2.25]</td>
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<tr>
<td>Total (95% CI)</td>
<td>25 / 163</td>
<td>22 / 161</td>
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<td>100.0</td>
<td>1.03 [0.58, 1.81]</td>
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Test for heterogeneity chi-square = 3.60 df = 3 p = 0.308
Test for overall effect = 0.09 p = 0.9
ED Care (Phase II)

- Q15 minute aerosols x 2 (salbutamol 5.0mg) then q30 min
- 120 mg methylprednisolone IV
- Heliox and non-invasive positive pressure ventilation – doesn’t seem to help
- Minimal improvement over 4-hour stay in the ED? What about magnesium
- Transfer to ICU
Magnesium sulfate for treating exacerbations of acute asthma in the emergency department
Rowe BH, Bretzlaff JA, Bourdon C, Bota GW, Camargo CA Jr.  The Cochrane Library October 1999

<table>
<thead>
<tr>
<th>Study</th>
<th>MgSO4 n/N</th>
<th>Placebo n/N</th>
<th>Peto Odds Ratio 95 % CI</th>
<th>Weight (%)</th>
<th>Peto Odds Ratio 95 % CI</th>
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<tr>
<td>01 Severe</td>
<td></td>
<td></td>
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<tr>
<td>Bloch 1995</td>
<td>7 / 21</td>
<td>11 / 14</td>
<td></td>
<td>13.1</td>
<td>0.17 [0.05, 0.65]</td>
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<td>Ciarallo 1997</td>
<td>11 / 15</td>
<td>16 / 16</td>
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<td>5.5</td>
<td>0.10 [0.01, 0.80]</td>
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<td>Devi 1997</td>
<td>9 / 15</td>
<td>15 / 16</td>
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<td>8.5</td>
<td>0.15 [0.03, 0.81]</td>
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<td>Skobeloff 1989</td>
<td>7 / 19</td>
<td>15 / 17</td>
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<td>13.3</td>
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<td>Test for overall effect=-5.08 p&lt;0.00001</td>
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</table>

| 02 Mild-moderate |           |             |                        |            |                        |
| Bloch 1995       | 14 / 46   | 13 / 54     |                        | 30.1       | 1.38 [0.57, 3.32]      |
| Green 1992       | 13 / 58   | 11 / 62     |                        | 29.4       | 1.34 [0.55, 3.26]      |
| Subtotal (95 % CI) | 27 / 104  | 24 / 116    |                        | 59.5       | 1.36 [0.72, 2.54]      |
| Test for heterogeneity chi-square=0.00 df=1 p=0.9627 |
| Test for overall effect=0.95 p=0.3 |

| Total (95 % CI) | 61 / 174  | 81 / 179    |                        | 100.0      | 0.54 [0.33, 0.88]      |
| Test for heterogeneity chi-square=20.69 df=5 p=0.00009 |
| Test for overall effect=-2.49 p=0.01 |

NNT = 7
Conclusions

- Even common medical conditions may not always treated in an evidence-based manner – there’s work to do!
- Shifting the balance from evidence availability to application can be achieved in part through awareness of pre-appraised resources
Future directions

- Clinician-friendly evidence summaries for Emergency Medicine
- Cochrane systematic review summaries in Annals
- ACPJC relevant to EM
- No specific resource evidence summaries for EM
- Evidence synopses may not equate to KT