Evidence-based implementation of evidence-based asthma guidelines in rural hospital emergency departments

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A thesis submitted to meet the requirements of the degree Doctor of Philosophy (by publication), School of Medicine and Public Health, Faculty of Health, University of Newcastle, Australia.
DECLARATION

I certify that the work embodied in this thesis is the result of original research and has not been submitted for recognition towards a higher degree at any other University or institution.

__________________
Steven Doherty

__________________
Date
DEDICATION

For my parents, John and Irene, who left their homeland in 1970 hoping to provide a better future for their family and provided the foundation for my career.
Acknowledgements

There are numerous people and organisations I would like to acknowledge for without them this body of work would never have been completed.

Firstly I would like to thank the staff at the National Institute of Clinical Studies (NICS) which is now a part of the NHMRC. NICS leads the way in reducing evidence-practice gaps in Australia. The three year NICS fellowship I was awarded was the trigger to develop this work into a thesis. Special mention should go to Sue Huckson and Rosie Forster whose roles in the fellowship program were substantial and greatly appreciated.

NICS appointed a leadership mentor, Dr Greg Stewart, who has been supportive of this work even after the fellowship elapsed. My NICS project mentor was also my PhD supervisor, Professor Peter Jones. Peter has been a huge support not only in driving me to pursue a PhD but also in his advice at all levels. His supervision has been greatly appreciated.

One other NICS contact warrants special mention and that is Professor John Ovretveit who during a couple of Masterclasses really helped to fine tune this body of research.

My co-authors on a number of the published papers included Professor Peter Jones, Dr Nick Ryan, Lin Davis, Helen Stevens, Verity Treeve, Dr Paul Leschke, Dr Anna Valpiani, Dr Emma Whitely and Dr Della Yarnold. I thank them for their efforts in the overall program of improving clinical practice as well as assistance with their respective studies.

I must thank all the staff, medical, nursing and clerical at the 12 hospitals in the former New England (now Hunter New England) Area Health Service for being prepared to embrace some changes in practice and providing access to records as required for the studies.

Finally, thanks to my wife Claire who has always been supportive of my clinical and academic life.
PUBLICATIONS INCORPORATED INTO THIS THESIS AND AUTHORSHIP STATEMENTS

This thesis includes nine peer reviewed publications in Emergency Medicine Australasia (3), International Journal of Health Care Quality Assurance (2), British Medical Journal (1), Journal of Paediatrics and Child Health (1), Rural and Remote Health (1) and the NHMRC website / NICS evidence into practice series (1).

In addition the British Medical Journal publication resulted in a number of rapid responses and replies. These are included in the relevant chapter, Chapter 5.

The International Journal of Health Care Quality Assurance was chosen as an appropriate quality journal to publish the proposed methodology, which was substantial, and generally of minimal interest to clinical staff. This allowed a brief summary of the methodology in the articles targeted at clinicians. Emergency Medicine Australasia, Journal of Paediatrics and Child Health and Rural and Remote Health were the most appropriate Australasian journals for the target clinicians. The British Medical Journal Change page was an appropriate forum for presenting evidence of the need for change.

I was the single author of the following 5 papers


3. Doherty SR. Prescribe systemic corticosteroids in acute asthma. BMJ 2009;338:b1234


One co-authored paper has a statement attesting to my principal authorship included in the published version. That paper is as follows.


Three other papers were co-authored and for all papers I was the principal author, drafted the manuscript, led the implementation team, developed the study design and concept, adapted and developed the guideline and performed the statistical analyses. Statements attesting to this, from all co-authors are included.


COMPETING INTERESTS

At the time of publication of the articles in Emergency Medicine Australasia, Steven Doherty was a section editor of that journal, though not involved in review of these papers. This competing interest is declared on each paper where relevant.

Associate Professor Steven Doherty
PRESENTATIONS RELATED TO THIS THESIS

In addition to the above publications a number of peer reviewed and invited presentations related to this thesis have been given. These presentations are listed below.

**Doherty, Steven.** *Development of an evidenced based implementation for rural EDs*  
Australian Research Alliance for Children and Youth  
“Closing the Know-do Gap” Conference, July 2005  
Peer reviewed conference oral presentation. Abstract and Power Point presentation on website

Peer reviewed conference oral presentation. Abstract published in conference proceedings

**Doherty, Steven.** *Clinical Guidelines in the ED- An Evidence-Based Implementation.* Australasia College of Emergency Medicine Winter Symposium, 20-23 July 2005, Queenstown, New Zealand  
Peer reviewed conference oral presentation. Abstract published in conference proceedings

**Doherty, Steven.** *Results of evidenced implementation across a spectrum of hospitals.* NSW Health Rural Critical care Winter Conference, September 2005  
Peer reviewed conference oral presentation.


**Doherty S.** "Overcoming the Gap" in Rural Health Australasian College for Emergency Medicine Annual Scientific Meeting – Invited presentation, peer reviewed meeting, Sydney, November 20, 2006.


**Doherty S.** *Barriers and facilitators to the uptake of guidelines in the ED.* National Institute of Clinical Studies Guidelines Symposium. Invited presentation, peer reviewed meeting, Melbourne, October 19, 2006.


AUTHORSHIP STATEMENT


We the undersigned agree that,

Steven Doherty was the principal author of this paper, drafted the manuscript, developed the study concept and design and performed the statistical analyses.

Ms Lin Davis

Dr Paul Leschke

Dr Anna Leschke (nee Valpiani)

Dr Emma Whiteley

Dr Della Yarnold

Ms Helen Stevens
AUTHORSHIP STATEMENT


We the undersigned agree that,

Steven Doherty was the principal author, drafted the manuscript, led the implementation team, developed the study design, adapted and developed the guideline and performed the statistical analyses in the above paper.

Professor Peter Jones

Ms Helen Stevens

Ms Lin Davis

Dr Nicholas Ryan

Ms Verity Treeve
AUTHORSHIP STATEMENT

Doherty SR, Jones PD. Use of an evidence-based implementation strategy to implement evidence-based care of asthma into rural district hospital emergency departments. Rural and Remote Health. 6:529 (online) 2006.

I, Peter Jones, confirm that Steven Doherty drafted the manuscript, led the implementation team, developed the study design, adapted and developed the guideline and performed the statistical analyses in the above paper.

Professor Peter Jones
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### List of Abbreviations

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<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>AGREE</td>
<td>Appraisal of Guidelines for Research and Evaluation</td>
</tr>
<tr>
<td>CEC</td>
<td>Clinical Excellence Commission</td>
</tr>
<tr>
<td>CECP</td>
<td>Children’s Emergency care project</td>
</tr>
<tr>
<td>CI</td>
<td>Confidence Interval</td>
</tr>
<tr>
<td>CO</td>
<td>Carbon Monoxide</td>
</tr>
<tr>
<td>CPG</td>
<td>Clinical Practice Guideline</td>
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<tr>
<td>EBI</td>
<td>Evidence Based Implementation</td>
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<tr>
<td>EBM</td>
<td>Evidence Based Medicine</td>
</tr>
<tr>
<td>ED</td>
<td>Emergency Department</td>
</tr>
<tr>
<td>FEV1</td>
<td>Forced Expiratory Volume in 1 second</td>
</tr>
<tr>
<td>FVC</td>
<td>Forced Vital Capacity</td>
</tr>
<tr>
<td>GLIA</td>
<td>Guideline Implementability Appraisal</td>
</tr>
<tr>
<td>GP</td>
<td>General Practitioner</td>
</tr>
<tr>
<td>HBO</td>
<td>Hyperbaric Oxygen</td>
</tr>
<tr>
<td>IV</td>
<td>Intravenous</td>
</tr>
<tr>
<td>IM</td>
<td>Intramuscular</td>
</tr>
<tr>
<td>MRC</td>
<td>Medical Research Council</td>
</tr>
<tr>
<td>NAC</td>
<td>National Asthma Council</td>
</tr>
<tr>
<td>NHMRC</td>
<td>National health and Medical Research Council</td>
</tr>
<tr>
<td>NICS</td>
<td>National Institute of Clinical Studies</td>
</tr>
<tr>
<td>NIV</td>
<td>Non-Invasive Ventilation</td>
</tr>
<tr>
<td>NNT</td>
<td>Number Needed to Treat</td>
</tr>
<tr>
<td>OR</td>
<td>Odds Ratio</td>
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<tr>
<td>PEFR</td>
<td>Peak Expiratory Flow Rate</td>
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<tr>
<td>PFT</td>
<td>Pulmonary Function Tests</td>
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<tr>
<td>PO</td>
<td>Per Oral</td>
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<tr>
<td>QI</td>
<td>Quality Improvement</td>
</tr>
<tr>
<td>RCT</td>
<td>Randomised Controlled Trial</td>
</tr>
<tr>
<td>RR</td>
<td>Relative Risk</td>
</tr>
<tr>
<td>VMO</td>
<td>Visiting Medical Officer</td>
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<tr>
<td>WHO</td>
<td>World Health Organisation</td>
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Abstract

Knowledge translation refers to the process whereby the findings from high quality clinical research are incorporated into clinical practice. Knowledge translation is therefore a key step in improving health care and ensuring that the benefits of clinical research flow onto patients. A gap currently exists between research and clinical practice because of uncertainty surrounding the best strategies to achieve knowledge translation. Evidence-Based Implementation is a concept that builds on the principals of evidence-based medicine and can be described as judicious use of the best available evidence to implement change in health care systems.

This thesis describes a body of work that lead to the development of an Evidence-Based Implementation (EBI) strategy for asthma management in rural emergency departments. The strategy was based on a review of the existing literature about achieving change in clinical practice, and the participation of the author in several workshops during a three year National Institute of Clinical Studies Research Fellowship, that sought to indentify the core elements required to achieve changes in clinical behaviour. At the time this study was being developed the literature indicated that a 10% improvement in clinical care would represent a successful implementation project. The hypothesis posed in this body of research was that greater improvements in the proportion of patients receiving care consistent with best practice could be achieved through using an EBI.

Asthma was chosen as the clinical condition to test the effectiveness of an EBI. Asthma was chosen because it is a common presentation to all Emergency Departments. There was also an abundance of literature available that allowed the development of a range of clinical indicators that would signal that a patient with asthma had received evidenced based, best practice health care. These markers also allowed the impact of the EBI to be accurately measured. Small and large rural Emergency Departments were used to assess the EBI in the format of controlled and before and after trials to further improve the validity of the estimated impact on clinical behaviour. These departments were individual workplace settings separated by hundreds of kilometres.

Key elements of the EBI strategy used in these studies included use of reminders, audit and feedback, outreach visits and education, anticipating barriers to change and use of opinion leaders. The evolution of the author as a broker between clinical practice and knowledge translation is another element that is discussed within the
thesis. These elements were chosen as they were considered to be the most relevant for the clinical environments studied, this constitutes the judicious aspect of an EBI.

Each of the studies in this series of papers demonstrated that the EBI strategy was able to achieve improvements in clinical indices of effective asthma management of 20-40% above baseline levels of clinical performance. This thesis demonstrates that in the environment of the rural emergency department, clinical indices for best practice asthma care can be improved using an EBI strategy. Further research is required to document if such improvements in clinical performance lead to actual improvements in patient outcomes and whether this approach to knowledge translation is applicable to other clinical scenarios. Further research is also required to determine which components of the EBI strategy had greatest impact in changing clinician behaviour.