Evidence-based practice in a rural and remote setting

A critical literature review
This report was commissioned by the National Institute of Clinical Studies, Australia.

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Acknowledgements

We would like to thank Ms Fiona Jenner for her assistance with the collation of reference material for this report.
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Executive Summary

Research Questions

What factors in a rural and remote setting influence the uptake of research findings by health care practitioners? What is the evidence for interventions to overcome these barriers in rural and remote clinical practice?

Methods

A critical literature review was conducted. Electronic health databases, internet sites and conference proceedings were searched for relevant studies, which could be experimental, evaluative or opinion-based. Studies were assessed for quality where appropriate.

Results

There is a paucity of empirical literature on implementing evidence-based practice in rural and remote settings. This is in stark contrast to the large amount of literature available on implementing evidence in other clinical settings.

The barriers to implementing evidence in rural and remote clinical practice have only been explored in two empirical studies, one of which was conducted on Australian general practitioners (GPs). This survey found that the barriers facing rural and remote GPs were not dissimilar to those facing urban GPs - such as time constraints, the diversity of general practice, the inapplicability of tertiary setting evidence to primary care, lack of skills and resources to search for and appraise evidence, and the fear of loss of clinical autonomy. Some factors were exacerbated by rural and remote location. These included inadequate information technology (IT) infrastructure, in particular slow and unreliable internet access, organisational constraints and isolation from colleagues.

Although many trials have assessed the effectiveness of interventions to overcome these barriers, none are specific to the rural and remote setting. It is generally considered that multifaceted interventions and those that rely on participation and are backed up with reminders are more effective than passive interventions relying on didactic education sessions. Although these interventions have not been evaluated in rural and remote settings, there is consistency in the findings across multiple healthcare settings.

Little of the research has addressed cost-effectiveness or the impact on patient outcomes.
Conclusions

There is a relationship between the cultural, organisational and personal context in which health professionals operate, and their ability and desire to incorporate evidence-based healthcare into their daily practice. This is particularly true for health professionals in rural and remote clinical practice in Australia, who work within constraints different to those of their urban counterparts. The wheel does not need reinventing with regard to the strategies for implementing evidence; rather the strategies need to be implemented in contextually appropriate ways.
Overview

Rationale for Assessment

This review was commissioned by the National Institute of Clinical Studies to provide background information for general practitioners who are attending a workshop. The objective of this workshop is to establish the key barriers to implementing evidence in rural and remote clinical practice in Australia and to investigate solutions to these barriers.

Research Questions

What factors in a rural and remote setting influence the uptake of research findings by health care practitioners? What is the evidence for interventions to overcome these barriers in rural and remote clinical practice?

Results

The implementation of evidence, that is, the adoption of practices that have been shown in good quality research to be effective in improving healthcare delivery, is accepted as a desirable and necessary part of the provision of health care around the world. In fact, it has been suggested that implementing evidence is especially important in rural and remote practice, to ensure the best outcomes for populations in areas with limited healthcare choice and resources (Taylor, Wilkinson et al. 2001).

The differences between metropolitan practice and rural and remote practice in Australia are well described, at least for General Practitioners (GPs). A comprehensive survey by Britt et al (Britt, Miles et al. 1993) showed that rural and remote general practitioners were demographically different from their city counterparts, being older, more likely to be male, and more likely to work in solo practice. Their practices were also busier. A survey of Queensland GPs showed that rural GPs practiced a wider range of clinical skills in an environment with restricted access to support from health professionals, worked longer hours and had more difficulty accessing locums (Wise, Hays et al. 1994). The population living in rural and remote areas is also different from that in urban areas, having generally poorer health status including lower life expectancy and higher rates of injury (Australian Institute of Health and Welfare 1998). Moreover, the sociodemographic structure of rural and remote populations is different to that in urban areas, with disadvantage increasing as population density decreases, and this impacts on the need for and use of health services (Australian Institute of Health and Welfare 1998).

Barriers to implementing evidence

This review examines studies describing the barriers to implementing evidence in rural and remote clinical practice, and the evidence for ways of overcoming these barriers in...
rural and remote areas. Whilst the barriers to implementing evidence, particularly for
general practitioners, are well described, the evidence for specific aspects of rural and
remote practice that affect the uptake of research findings is very limited. Likewise, there
is a large body of research investigating the implementation of evidence and the process
of getting research findings into practice. There are hundreds of trials and evaluations,
many systematic reviews (e.g. Davis, Thomson et al. 1995; Oxman, Thomson et al. 1995;
Davis and Taylor-Vaisey 1997; McCarthy and Hegney 1998) and even overviews of
systematic reviews (Bero, Grilli et al. 1998; NHS Centre for Reviews and Dissemination
1999). However, again there is very little information available about interventions to
implement evidence specifically in rural and remote settings.

Studies exploring the barriers to implementing evidence have found that there are several
key issues. These studies have focused predominantly on general practitioners, probably
reflecting where the bulk of the evidence has been generated. Research indicates that
evidence is difficult to implement due to:

• Time constraints

• The diversity of clinical problems seen in general practice

• The applicability of randomised controlled trial evidence, usually from tertiary
settings, to general practice

• A lack of skills and resources to search for and appraise evidence

• A fear of a lessening of clinical autonomy (i.e. ‘cook-book medicine’)

• A fear of litigation

• Patient expectations and demands;

to name but a few (Mayer 1999; Rosser 1999; Taylor, Wilkinson et al. 2001). One survey
of Australian General Practitioners (Taylor, Dollard et al. 2000) showed that in the rural
and remote setting, some of these issues are exacerbated by:

• Inadequate access to information technology resources and slow and unreliable
internet connections

• Isolation from colleagues

• Increased workload and more severe time and organisational constraints, particularly
to attend training sessions.

The only other empirical data on barriers to the implementation of evidence, by rural and
remote health professionals, came from a Scottish study (Farmer and Richardson 1997)
of remote community nurses, and focussed particularly on access to information. This
study found that nurses had little skill and experience in using information technology to
find resources, and had very limited opportunity to do so, because of a lack of
infrastructure. A survey in Australia conducted on general aspects of technology use...
(such as for communication and administrative tasks) in rural and remote healthcare settings found similar results, with health professionals lacking training and technical support (Togno, Lundin et al. 1996).

Commentators have supported the findings from the empirical studies; however their statements are largely based on anecdote or have been extrapolated from other settings.

**Effective interventions**

With regard to interventions to overcome these barriers, again a huge literature exists. One overview of systematic reviews of interventions to promote the implementation of research findings included 18 systematic reviews, some of which analysed more than 100 trials (Bero, Grilli et al. 1998). This overview commented on the lack of evidence for effectiveness in the interventions evaluated, despite the large amount of research. Overall, it appears that:

- Interventions that are multifaceted work better than those that employ a single strategy. Multifaceted interventions can include a combination of audit and feedback, reminders, local consensus processes or marketing

- Manual or computerised reminders are consistently effective

- Audit and feedback, local opinion leaders, local consensus processes, and patient mediated interventions are of variable effectiveness

- Passive dissemination and didactic educational meetings have little effect.

Again, these findings are from settings not specific to rural and remote settings. Evidence from rural and remote clinical practice is very scarce, with only one relevant empirical study located (McGowan 2000). This study was of questionable quality and almost certainly not applicable to Australia, given that the intervention involved adding extra personnel to a group already established and dedicated to helping primary care practitioners to access information. This is a high cost and probably short-term solution. There are no relevant empirical studies in Australia.

There is a growing literature on telemedicine, both in Australia and elsewhere, although at this stage its evaluation has been limited to consultation and diagnosis, rather than as a tool to implement evidence. A systematic review assessing the benefits of telemedicine found that studies focussed on the diagnosis and treatment of varying conditions in different healthcare settings. However, the review concluded that the evidence for the efficacy, effectiveness and cost-effectiveness of telemedicine was limited and that the studies were generally of poor quality (Hailey, Roine et al. 2002).

No evidence for the implementation of evidence-based practice in rural and remote settings was found in relation to Aboriginal health, despite this being one of the seven goals of ‘Healthy Horizons’ - the Commonwealth Government framework for improving health in rural and remote Australia (National Rural Health Policy Forum 1999).
The key objective of evidence-based practice is to improve outcomes for patients. Yet only one of the reviews (on implementing evidence in general) found in the search mentioned patient outcomes, and only a small proportion of trials within that review actually measured them (Worrall, Chalk et al. 1997). This review of clinical practice guidelines (CPGs) found that CPGs had little impact on patient outcome, although the quality of the trials was poor. This raises important questions for future research regarding the implementation of evidence. If patient outcomes are not improved by the uptake of research findings, then there needs to be a serious examination of the relevance, quality and implementation of the existing evidence. The impact of evidence-based practice on the organisation of healthcare and the cost of delivery also needs to be considered, but the primary consideration should be benefit for the patient.

The lack of available evidence on interventions that promote the uptake of research findings in rural and remote clinical practice is striking, although the consistency of evidence from other settings is useful. Nearly all of the authors of studies that assessed the implementation of evidence-based practice have emphasised the relationship between the cultural, organisational and personal context in which health professionals operate, and their ability and desire to incorporate evidence-based healthcare into their daily practice. This is particularly true for health professionals in rural and remote clinical practice in Australia. The wheel does not need reinventing with regard to the strategies for implementing evidence; rather the strategies need to be implemented in contextually appropriate ways.
Methods

Approach to Assessment

A protocol was followed for this critical literature review with elements as follows:

Inclusion criteria

Studies were included as part of this critical literature review if they provided relevant information on -

Participants: Health professionals who practiced in rural and remote settings.

Studies:

- Any empirical studies that reported on:
  1. The barriers to the implementation of evidence faced in rural and remote areas of Australia. These studies were generally exploratory by nature.
  2. Interventions for implementing evidence-based practice or an element of evidence-based practice in rural and remote areas. These studies were experimental eg trials.

- Barriers or ways of overcoming barriers to implementing evidence based practice in rural and remote areas, based on opinions and commentaries rather than empirical research.

The definition of evidence-based practice was deliberately undefined so as to maximise the yield from the search.

Comparator:

For those experimental studies reporting on interventions for implementing evidence-based practice, the comparator was either the pre-intervention or baseline state, or a control group not receiving the intervention.

Outcomes:

Exploratory studies:

Determination of the barriers to the implementation of evidence in rural and remote clinical practice.
**Intervention (effectiveness) studies:**

The effectiveness of interventions at addressing barriers to the implementation of evidence in rural and remote clinical practice, measured by the following outcomes:

- patient health status and/or satisfaction with care
- uptake of the intervention(s) by the target practitioners eg change in professional practice
- sustainability of the intervention(s)
- cost and cost-effectiveness of the intervention(s)

**Eligible Study Designs:**

The eligible study designs for assessing the effectiveness of interventions included - randomised controlled trials (including cluster randomised controlled trials), concurrently controlled trials, controlled before-and-after studies, and interrupted time series\(^1\). The inclusion of these study designs is recommended by the Cochrane Effective Practice and Organisation of Care (EPOC) Group (Bero, Grilli et al. 2002). Due to the paucity of literature and the exploratory nature of part of the research question, the review also considered cross-sectional surveys, uncontrolled before-and-after studies, other evaluations and commentaries. The quality of these studies and their applicability will be discussed.

**Language:**

Searches were restricted to English language publications.

**Search strategy**

The medical literature was searched to identify relevant studies and reviews on implementing evidence in rural and remote clinical practice. In addition, relevant internet sites and conference proceedings were searched. The reference lists of relevant articles were searched for studies potentially missed in the electronic search. The search period requested by the National Institute of Clinical Studies was from January 1990 to

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\(^1\) a design where there is a clearly defined point in time when the intervention occurred and at least three data points before and three after the intervention
July 2002. Details of the search strategy and databases used to collate literature are included in Appendices A through C.

**Expert Sources**

Any information provided by expert clinicians associated with this review was assessed as to whether it met the inclusion criteria.

**Validity Assessment**

**Exploratory studies:**

Surveys were assessed according to basic research design principles, including representativeness of the sample, response rate and quality of the survey instrument. Commentaries and opinion pieces were only described – validity assessment is not relevant for this lowest level of research evidence. The data are only suitable for hypothesis-generation.

**Intervention (effectiveness) studies:**

The evidence presented in the selected studies was assessed and classified using the dimensions of evidence defined by the National Health and Medical Research Council, where relevant (National Health and Medical Research Council 2000).

These dimensions (Table 1) include: the strength of the evidence, size of the effect and relevance of the evidence. This approach to assessment of study quality incorporates appraisal of study methodology, as well as clinical import or relevance.

**Table 1: Evidence dimensions**

<table>
<thead>
<tr>
<th>Type of evidence</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strength of the evidence</td>
<td></td>
</tr>
<tr>
<td>Level</td>
<td>The study design used, as an indicator of the degree to which bias has been eliminated by design.*</td>
</tr>
<tr>
<td>Quality</td>
<td>The methods used by investigators to minimise bias within a study design.</td>
</tr>
<tr>
<td>Statistical precision</td>
<td>The p-value or, alternatively, the precision of the estimate of the effect. It reflects the degree of certainty about the existence of a true effect.</td>
</tr>
<tr>
<td>Size of effect</td>
<td>The distance of the study estimate from the “null” value and the inclusion of only clinically important effects in the confidence interval.</td>
</tr>
<tr>
<td>Relevance of evidence</td>
<td>The usefulness of the evidence in clinical practice, particularly the appropriateness of the outcome measures used.</td>
</tr>
</tbody>
</table>

*See Table 2

Three sub-domains (level, quality and statistical precision) are collectively a measure of the methodological strength of the evidence. The designations of the levels of evidence are shown in Table 2.
Table 2: Designations of levels of evidence*

<table>
<thead>
<tr>
<th>Level of evidence</th>
<th>Study design</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Evidence obtained from a systematic review of all relevant randomised trials</td>
</tr>
<tr>
<td>II</td>
<td>Evidence obtained from at least one properly-designed randomised trial</td>
</tr>
<tr>
<td>III-1</td>
<td>Evidence obtained from well-designed pseudorandomised controlled trials (alternate allocation or some other method)</td>
</tr>
<tr>
<td>III-2</td>
<td>Evidence obtained from comparative studies (including systematic reviews of such studies) with concurrent controls and allocation not randomised, cohort studies, case-control studies, or interrupted time series with a control group</td>
</tr>
<tr>
<td>III-3</td>
<td>Evidence obtained from comparative studies with historical control, two or more single arm studies, or interrupted time series without a parallel control group</td>
</tr>
<tr>
<td>IV</td>
<td>Evidence obtained from case series, either post-test or pre-test/post-test</td>
</tr>
</tbody>
</table>

*Modified from (National Health and Medical Research Council 1999)

Study quality was assessed using the "Assessment of Methodological Quality" checklist developed by the Cochrane Effective Practice and Organisation of Care Group (see Appendix D). This checklist uses seven standard criteria to assess the quality of randomised and concurrently controlled trials, controlled before-and-after studies and interrupted time series. Information on specific methodological components shown empirically to impact on treatment effect sizes are included in this checklist – specifically, concealment of allocation, blinding, and completeness of data (Schulz, Chalmers et al. 1995; Moher, Pham et al. 1998; Juni, Altman et al. 2001).

Statistical precision was determined, where relevant, using standard statistical principles.

Rank scoring methods (National Health and Medical Research Council 2000) were used, where appropriate, to determine the clinically important benefit of the effect size in studies, as well as the clinical relevance of the evidence. Templates are provided in Appendix E.

**Data Extraction and Analysis**

Where possible, information on each of the relevant outcomes was extracted, tabulated and summarised in the results tables.
Results

There is little available literature on the barriers to implementing evidence in rural and remote clinical practice. The search failed to locate any relevant experimental studies conducted in rural and remote areas. This is despite a considerable literature on getting evidence into practice in other settings. Therefore it was difficult to conduct an appropriate validity assessment, including the levels of evidence as stipulated by the National Health and Medical Research Council (NHMRC).

The only empirical studies available came from cross-sectional surveys or uncontrolled before-and-after studies. The literature did contain a number of commentaries on the topic, generally from conference proceedings and journal editorials. Some of these have been included in the results tables, despite their lack of empirical evidence, to give a flavour of the thinking in Australia on the barriers to implementing evidence in rural and remote clinical practice, and how to overcome them.

Several systematic reviews and overviews of systematic reviews of trials conducted in settings other than rural and remote have been included. These data were not obtained nor reported systematically as the research is extensive and only provides background information for this review topic. However it highlights the research that has been done on implementing evidence, in Australia and around the world, that is not specific to the rural and remote setting. It must be remembered that the context of rural and remote health in Australia must be taken into account when considering the implementation of any of these interventions in this country.

What barriers to implementing evidence in rural and remote clinical practice have been found?

There is very little empirical evidence about the barriers to the uptake of research findings in rural and remote areas. This is in contrast to the available evidence in other settings. Table 3 shows the only empirical work done on this topic. Table 4 describes overviews of systematic reviews and systematic reviews concerned with barriers to implementing evidence in other settings, such as urban clinical practice. Table 5 presents commentaries that have been made on these issues.

What interventions to implementing evidence in rural and remote clinical practice are effective?

Again, empirical evidence in the rural and remote setting is scarce, although again many trials and systematic reviews have looked at interventions to implement evidence in other settings. One study was identified that implemented an intervention directly to assess barriers in rural areas; this is detailed in Table 6. An overview of systematic reviews about interventions to implement evidence in other settings is detailed in Table 7, along with a relevant systematic review. Table 8 presents commentaries on this topic; these are from conference proceedings and journal editorials and are not grounded in any empirical research.
<table>
<thead>
<tr>
<th>Authors</th>
<th>Design</th>
<th>Main results</th>
<th>Main conclusions</th>
<th>Study quality</th>
<th>Comments</th>
</tr>
</thead>
</table>
| (Taylor, Dollard et al. 2000) | Survey conducted face-to-face with General Practitioners in regional South Australia, n=89 | 84% of GPs identified barriers to practising evidence-based medicine:  
- difficulty finding, accessing and using evidence and obtaining information in a timely manner (50%)  
- rural location and practice, including being isolated from colleagues, not being able to receive CME and working from different locations (36%)  
- lack of time (25%)  
- infrastructure limitations, for example computer hardware and software and slow and unreliable internet access (20%)  
- conflict with patient expectations (19%)  
- difficulty with implementing new way of practicing (15%)  
- lack of research and evidence in general practice (14%). | While many of the barriers to implementing evidence have been reported before, there are aspects specific to the rural context that make the implementation of evidence-based medicine difficult in these areas. | Good quality study. Participants were all GPs practising in 3 rural, regional and remote divisions of general practice. High response rate (89%). Survey instrument designed by authors and pilot tested; administered by trained interviewers. | This study supports anecdotal evidence that some of the barriers to implementing evidence-based general practice in rural and remote areas are the same as for other locations. However, some of these barriers are exacerbated by the rural location, especially those related to IT infrastructure, isolation and lack of time. |

1CME= continuing medical education; IT= information technology
### Table 3 (cont.): Evidence about the barriers to the uptake of research findings in rural and remote clinical practice – exploratory studies

<table>
<thead>
<tr>
<th>Authors</th>
<th>Design</th>
<th>Main results</th>
<th>Main conclusions</th>
<th>Study quality</th>
<th>Comments</th>
</tr>
</thead>
</table>
| (Farmer and Richardson 1997) | Survey of community nurses, midwives and health visitors in Western Isles of Scotland, n=63 | Most common problems with access to information were:  
• low awareness of and access to databases such as Medline  
• distance from hospital library  
• lack of local information resources  
• lack of awareness of what information is available  
• difficulty assessing relevance of information  
• little experience in information technology use. | If nurses are to be equipped to deal with the demands of evidence-based healthcare, then they need to be provided with basic skills in information awareness and use. Need for improved access to information resources. | Reasonable quality study although not clear how survey administered; good response rate (89%). All community nurses, midwives and health visitors on islands eligible (n=71). Survey designed by author; no mention of validity testing. Numbers for results not given. | This study supports anecdotal evidence and highlights that health professionals other than doctors are being expected to implement evidence-based healthcare and face similar problems with access to information and its use. |
Table 4: Evidence pertaining to the barriers to the uptake of research findings in rural and remote clinical practice – evidence from non-rural settings

<table>
<thead>
<tr>
<th>Authors</th>
<th>Design</th>
<th>Main results</th>
<th>Main conclusions</th>
<th>Study quality</th>
<th>Comments</th>
</tr>
</thead>
</table>
| (NHS Centre for Reviews and Dissemination 1999) | Overview of 44 systematic reviews about getting evidence into practice | Getting evidence into practice is affected by:  
• ineffective or absent communication about evidence-based health care  
• evidence contrary to practitioners’ own views  
• individual decision making  
• stress levels  
• lack of time  
• lack of resources  
• geography  
• natural tendency to return to previous practice. | The reasons why evidence does not get into practice are complex and need to be understood to deal with it constructively. | Summary of findings from systematic reviews. No quality assessment of reviews. | Although not directly related to the rural or remote context, these issues are likely to apply to practice in rural and remote areas. |
Table 4 (cont.): Evidence pertaining to the barriers to the uptake of research findings in rural and remote clinical practice – evidence from *non-rural* settings

<table>
<thead>
<tr>
<th>Authors</th>
<th>Design</th>
<th>Main results</th>
<th>Main conclusions</th>
<th>Study quality</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Davis and Taylor-Vaisey 1997)</td>
<td>Systematic review of clinical practice guideline (CPG) implementation strategies</td>
<td>There are many variables that affect the adoption of CPGs: • guidelines’ quality (compatibility with existing beliefs and values, complexity, and ability to be observed or trialed) • characteristics of the health care professional (demographics and training) • incentives • regulation of clinical practice • patient factors.</td>
<td>The adoption of CPGs should be considered in a contextual manner, realising that factors specific to practitioners and their patients will influence their uptake. Adoption of CPGs will also require integration between guideline developers, implementers and users.</td>
<td>Comprehensive but a narrative-style review rather than a systematic review, possibly open to selection bias. However consistent with findings of other reviews.</td>
<td>Again, the issues apply to the rural and remote setting, especially considering the emphasis on the importance of context in the development and implementation of CPGs. The variables that affect the uptake of CPGs do differ between the urban and rural setting and so should be considered.</td>
</tr>
<tr>
<td>(Veale, Weller et al. 1999)</td>
<td>Commentary published in Australian Family Physician</td>
<td>• Guidelines differ in their use and impact and it has been difficult to assess their effect on clinical outcomes. • The sporadic development and varying quality of guidelines in Australia means they are unlikely to contribute to measurable improvements in health. • However enthusiasm for guidelines is likely to grow due to their potential to increase the role of evidence in decision making.</td>
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<td></td>
<td></td>
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</tbody>
</table>

14 Evidence-based practice in a rural and remote setting
These papers are not ‘research’ and not empirical in any way. They are the opinions of the author and not necessarily backed up by any evidence.

<table>
<thead>
<tr>
<th>Authors</th>
<th>Design</th>
<th>Main points</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Weller 1999)</td>
<td>Commentary for conference</td>
<td>Barriers to implementing evidence in rural settings include:</td>
</tr>
<tr>
<td></td>
<td>presentation</td>
<td>• unreliable communication</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• few technological resources</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• greater time barriers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• fewer opportunities for participating in multidisciplinary teams.</td>
</tr>
<tr>
<td>(McDonald</td>
<td>Commentary for conference</td>
<td>Barriers to implementing evidence in rural settings include:</td>
</tr>
<tr>
<td>2001)</td>
<td>presentation</td>
<td>• a lack of well designed studies identifying effective health interventions in a rural context</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• generalisability of evidence from other settings being hampered by inadequate resources, lower rates of compliance, genetic, cultural or environmental influences</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• evidence relates to the biomedical model of health when differences in rural health status are often attributable to social factors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• greater time pressure facing rural general practitioners</td>
</tr>
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<td></td>
<td></td>
<td>• inapplicability of “universal” clinical practice guidelines</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• poorer access to research databases</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• a lack of organisational support</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• breadth of practice makes implementing evidence particularly challenging</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• guidelines tend to make assumptions about the structure and availability of services that often do not apply in rural areas</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• other health professionals may reject evidence-based medicine seeing it as “doctor-centric”.</td>
</tr>
</tbody>
</table>
Table 6: Evidence from interventions to address the barriers to implementing evidence in rural and remote clinical practice – empirical studies

<table>
<thead>
<tr>
<th>Authors</th>
<th>Design</th>
<th>Methods</th>
<th>Outcome measures</th>
<th>Main results</th>
<th>Study quality</th>
<th>Comments</th>
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</thead>
</table>
| (McGowan 2000)   | Uncontrolled before-and-after | The intervention included a package of electronic information resources and training in how to use them. Electronic resources included databases such as PubMed, full-text access to journals, practice guidelines and patient education resources, all available through a website. Hands-on training was provided. | Survey pre-intervention (n=170) to assess use of knowledge-based information in support of clinical decision making and level of computer literacy. Survey post-intervention (n=39) to assess use of the electronic package of resources; types of information used, preferred site, reason for use and impact on clinical decision making. Post-intervention survey was either paper-based or online. | • The most used resources were: Medline (33%), journals (24%) and guidelines (13%).  
• Greatest use was for patient care (36%) and personal education (25%).  
• 82% of respondents handled clinical situations differently using the information obtained.  
• Unnecessary hospital admission avoided in 14% of use; mortality in | The sample was self-selected and represented only 12% of physicians in the area. The physicians surveyed pre and post intervention were not necessarily the same people, and only n=39 participated in the post-evaluation. Impact on clinical decision making and avoidance of adverse outcomes was self-reported and not validated in any way. | There are many problems with this study that make the results difficult to interpret and apply to the Australian setting. Although it tried to address one of the known barriers to implementing evidence in improving access to information, the evaluation was poor thus limiting its utility. |
Evidence-based practice in a rural and remote setting
Table 7: Evidence from interventions to address the barriers to implementing evidence in rural and remote clinical practice – evidence from non-rural settings

<table>
<thead>
<tr>
<th>Authors</th>
<th>Design</th>
<th>Main results</th>
<th>Main conclusions</th>
<th>Study quality</th>
<th>Comments</th>
</tr>
</thead>
</table>
| (Bero, Grilli et al. 1998)    | Overview of systematic reviews of interventions to promote the uptake of research findings. | • Consistently effective interventions included: educational outreach visits, reminders, multifaceted interventions (including two or more of audit and feedback, reminders, local consensus processes or marketing), and interactive educational meetings (e.g. participation in workshops).  
• Variably effective interventions included audit and feedback, local opinion leaders, local consensus processes, patient-mediated interventions.  
• Ineffective interventions included the distribution of educational materials and CPGs, and didactic education meetings. | There is strikingly little known about the effectiveness and cost-effectiveness of interventions that aim to change the practice or delivery of health care. Results suggest that more intensive efforts to alter practice are more successful than passive strategies. Dissemination and implementation activities need to be rigorously evaluated. | Overview under the auspices of Cochrane Effective Practice and Organisation of Care Review Group. Summary of systematic review results. Quality of reviews appraised in narrative manner. | Although not specific to rural and remote settings, the effectiveness of evidence-based interventions is applicable to all locations. Research so far has generally been of poor quality and difficult to interpret. There are some strong pointers for researchers undertaking implementation programs, particularly the need for multifaceted approaches. |
Table 7 (cont.): Evidence from interventions to address the barriers to implementing evidence in rural and remote clinical practice – evidence from non-rural settings (cont.)

<table>
<thead>
<tr>
<th>Authors</th>
<th>Design</th>
<th>Main results</th>
<th>Main conclusions</th>
<th>Study quality</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Worrall, Chalk et al. 1997)</td>
<td>Systematic review of clinical practice guideline implementation strategies, with outcome being impact on patient outcomes</td>
<td>• 5/13 studies showed a significant improvement in patient outcomes as a result of the use of CPGs &lt;br&gt; • 4/9 locally developed and 1/4 nationally developed guidelines resulted in significant improvements &lt;br&gt; • 2/6 studies using computerized reminder systems to prompt physicians resulted in significant improvements &lt;br&gt; • 3/6 studies using small-group or education sessions resulted in significant improvement.</td>
<td>The studies showed little evidence that CPGs are effective at improving patient outcomes in primary care. However there were concerns about the quality of the studies which were generally small and not well controlled for contamination. Also, many of the guidelines were published before the advent of evidence-based guideline development. Few of the studies used adequate outcome measures.</td>
<td>Comprehensive and well-conducted systematic review, fulfils all of the QUOROM statement requirements for methodology (Moher, Cook et al. 2000). Search conducted up to 1995.</td>
<td>This is one of very few reviews that assessed patient outcomes. Patient outcomes are the ultimate marker of the effectiveness of implementing evidence. This has not been a strong focus of research to date, and needs to be considered.</td>
</tr>
</tbody>
</table>
Table 8: Evidence from interventions to address barriers to implementing evidence in rural and remote clinical practice – commentaries

These papers are not studies and not empirical in any way. They are the opinions of the author and not necessarily backed up by any evidence.

<table>
<thead>
<tr>
<th>Authors</th>
<th>Design</th>
<th>Main points</th>
<th>Comments</th>
</tr>
</thead>
</table>
| (Weller 1999)   | Commentary for conference presentation      | Strategies to increase the uptake of evidence-based health care in rural and remote areas include:  
- the development of a research culture that addresses environmental and contextual issues of rural health  
- encouraging evidence-based and rural practice through training programs  
- a process of implementing evidence that is driven by consumers  
- ensuring government initiatives that focus on evidence-based health care are concerned with effectiveness and not cost. | Suggestions only, no empirical support for these programs                                          |
| (Monaghan 1999) | Description of a program designed to help primary care practitioners access information.  | • A team of information specialists use the Health Authority Resource Centre on behalf of primary care practitioners to access information to answer clinical questions  
• They produce a newsletter which translates evidence-based literature into easy-to-read bullet points.  
• The project runs in South Humber, UK.  
• There is no formal evaluation as yet however anecdotal evidence suggests there are high levels of use and satisfaction. | This study is difficult to interpret without a formal evaluation but it does address some of the barriers to information access. The strategy is characterised by a high cost as it relies on continuing employment of information specialists. |
References


Appendix A: HTA Websites

Websites of Health Technology Assessment Groups

AUSTRALIA

- Australian Safety and Efficacy Register of New Interventional Procedures – Surgical (ASERNIP-S)  
  http://www.surgeons.org/open/asernip-s.htm
- Centre for Clinical Effectiveness (Monash University, Australia)  
- Health Economics Unit, Monash University  
  http://chpe.buseco.monash.edu.au

AUSTRIA

- Institute of Technology Assessment / HTA unit  
  http://www.oeaw.ac.at/ita/e1-3.htm

CANADA

- Agence d'Evaluation des Technologies et des Modes d'Intervention en Santé (AETMIS)  
- Alberta Heritage Foundation for Medical Research (AHFMR)  
  http://www.ahfmr.ab.ca/publications.html
- Canadian Coordinating Office for Health Technology Assessment (CCHOTA)  
  http://www.ccohta.ca/newweb/pubapp/pubs.asp
- Canadian Health Economics Research Association (CHERA/ACRES) – Cabot database  
  http://www.mycabot.ca
- Centre for Health Economics and Policy Analysis (CHEPA), McMaster University  
  http://www.chepa.org
- Centre for Health Services and Policy Research (CHSPR), University of British Columbia  
  http://www.chspr.ubc.ca
- Health Utilities Index (HUI)  
  http://www.fhs.mcmaster.ca/hug/index.htm
- Institute for Clinical and Evaluative Studies (ICES)  
  http://www.ices.on.ca

DENMARK

- Danish Institute for Health Technology Assessment (DIHTA)  
  http://www.dihta.dk/publikationer/index_uk.asp

FINLAND

- FINOHTA  
  http://www.stakes.fi/finohta/e/
FRANCE
• L’Agence Nationale d’Accréditation et d'Evaluation en Santé (ANAES)
  http://www.anaes.fr/

GERMANY
• German Institute for Medical Documentation and Information (DIMDI) / HTA
  http://www.dahta.dimdi.de/
• German Scientific Working Group of Technology Assessment
  http://www.epi.mb-hannover.de/(eng)/hta.html

THE NETHERLANDS
• Health Council of the Netherlands Gezondheidsraad
  http://www.gr.nl/engels/welcome/frameset.htm

NEW ZEALAND
• New Zealand Health Technology Assessment (NZHTA)
  http://nzhta.chmeds.ac.nz/

NORWAY
• Norwegian Centre for Health Technology Assessment (SMM)
  http://www.oslo.sintef.no/smm/Publications/Engsmdrag/FramesetPublication.s.htm

SPAIN
• Agencia de Evaluación de Tecnologías Sanitarias, Instituto de Salud “Carlos III”/Health Technology Assessment Agency (AETS)
  http://www.isciii.es/aets/cdoc.htm
• Catalan Agency for Health Technology Assessment  (CAHTA)
  http://www.aatm.es/cgi-bin/frame.pl/ang/pu.html

SWEDEN
• Swedish Council on Technology Assessment in Health Care (SBU)
  http://www.sbu.se/admin/index.asp

SWITZERLAND
• Swiss Network on Health Technology Assessment (SNHTA)
  http://www.snhta.ch/

UNITED KINGDOM
• Health Technology Board for Scotland  http://www.htbs.org.uk/
- National Health Service Health Technology Assessment (UK) / National Coordinating Centre for Health Technology Assessment (NCCHTA) http://www.hta.nhsweb.nhs.uk/

- University of York NHS Centre for Reviews and Dissemination (NHS CRD) http://www.york.ac.uk/inst/crd/

- National Institute for Clinical Excellence (NICE) http://www.nice.org.uk/index.htm

UNITED STATES
- Agency for Healthcare Research and Quality (AHRQ) http://www.ahrq.gov/clinic/techix.htm


- U.S. Dept. of Veterans Affairs Technology Assessment Program (VATAP) http://www.va.gov/resdev/prt/pubs_individual.cfm?webpage=pubs_ta_reports.htm
Appendix B: Specialty Websites

Rural and Remote Health Websites

The following electronic internet sites and databases were searched for relevant literature up until July 2002:

**Websites with searchable publication databases**

- Irish Institute of Rural Health  [www.rural-health.net/RrlHlth.htm](http://www.rural-health.net/RrlHlth.htm)

**Websites without searchable publication databases**

- Western Australian Centre for Remote and Rural Medicine (WACRRM)  [http://www.general.uwa.edu.au](http://www.general.uwa.edu.au)
Evidence-based practice in a rural and remote setting

- Australian College of Rural and Remote Medicine [http://www.acrrm.org.au]
- Queensland Rural Workforce Agency [http://www.cme.net.au]
- Rural Medical Family Network [http://www.rmfn.org.au]
- Royal Australian College of General Practice [www.racgp.org.au]
- Drs Reference Site [www.drsref.com.au]
- The Royal Society of Medicine [www.roysocmed.ac.uk]
- Australian Medical Association [www.ama.com.au]
- Australians Division Homepage [www.gp.org.au]
- Royal Australasian College of Surgeons [www.racs.edu.au]
General Websites

- US Department of Health and Human Services (reports and publications)
  http://www.os.dhhs.gov/

- New York Academy of Medicine Grey Literature Report

- Scirus – for Scientific Information Only (http://www.scirus.com)

- Trip database (http://www.tripdatabase.com)

- International Society of Technology Assessment in Health Care
  (http://www.istahc.org/en/welcome.html)

- International Network for Agencies for Health Technology Assessment
  (http://www.inahta.org/) - the same Health Technology Assessment database
  that is held in the Cochrane Library.

- National Library of Medicine Health Services / Technology Assessment Text
  (http://text.nlm.nih.gov/)

Appendix C: Search Strategy

Search Strategies

The search terms used in this review were nominated by NICS. They were:

Evidence; rural health professionals; barriers; uptake of evidence; strategies; clinical practice; rural; remote; primary clinical care; hospital care; rural doctors; geographical location; resources; internet; education; rural populations; telemedicine; indigenous; training; nurses.

Combinations of these search terms were used to ensure maximum yield from the search.

The following electronic databases were searched for this review:

<table>
<thead>
<tr>
<th>Electronic Database</th>
<th>Time Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>AustHealth (Informit)</td>
<td>1997 - 7/2002</td>
</tr>
<tr>
<td>Australian Medical Index (Informit)</td>
<td>1996 - 7/2002</td>
</tr>
<tr>
<td>Australian Public Affairs Information Service (APAIS) - Health (Informit)</td>
<td>1995 - 7/2002</td>
</tr>
<tr>
<td>Cinahl (Silverplatter)</td>
<td>1990 - 7/2002</td>
</tr>
<tr>
<td>Cochrane Library – including, Cochrane Database of Systematic Reviews, Database of Abstracts of Reviews of Effectiveness, the Cochrane Controlled Trials Register, the Health Technology Assessment Database, the NHS Economic Evaluation Database</td>
<td>1990 - Issue 3, 2002</td>
</tr>
<tr>
<td>Current Contents (Ovid)</td>
<td>1990 – 7/2002</td>
</tr>
<tr>
<td>Embase (Embase.com)</td>
<td>1990 – 7/2002</td>
</tr>
<tr>
<td>Pre-Medline and Medline (Silverplatter)</td>
<td>1990 – 7/2002</td>
</tr>
<tr>
<td>PsychInfo (Silverplatter)</td>
<td>1990 - 7/2002</td>
</tr>
<tr>
<td>Web of Science – Science Citation Index Expanded</td>
<td>1990 – 7/2002</td>
</tr>
</tbody>
</table>
Appendix D: EPOC checklist

Assessment of Methodological Quality


Standard criteria are used to assess the methodological quality of studies included in EPOC reviews (protection against bias). Each criterion is scored as DONE, NOT CLEAR, or NOT DONE.

Seven standard criteria are used to assess the methodological quality of RCTs and CCTs:

1. Concealment of allocation (protection against selection bias). This is scored as DONE if the unit of allocation was by institution, team or professional and any random process was described explicitly; or if the unit of allocation was by patient or episode of care and there was some form of centralised randomisation scheme, an on-site computer system or sealed opaque envelopes were used.

2. Follow-up of professionals (protection against exclusion bias). This is scored as DONE if outcome measures were obtained for 80-100% of subjects randomised.

3. Follow-up of patients. This is scored as DONE if outcome measures were obtained for 80-100% of patients randomised, or for patients who entered the trial.

4. Blinded assessment of primary outcome(s) (protection against detection bias). This is scored as DONE if the authors state explicitly that the primary outcome variables were assessed blindly, or the outcome variables are objective, e.g. length of hospital stay, drug levels as assessed by a standardised test. Primary outcome(s) are those variables that correspond to the primary hypothesis or question as defined by the authors. In the event that some of the primary outcome variables were assessed in a blind fashion and others were not, each is scored separately.

5. Baseline measurement. This is scored as DONE if performance or patient outcomes were measured prior to the intervention, and no substantial differences were present across study groups.

6. Reliable primary outcome measure(s). This is scored as DONE if there were two or more raters with at least 90% agreement or kappa greater than or equal to 0.8 OR the outcome data were obtained from some automated system, e.g. length of hospital stay, drug levels as assessed by a standardised test.

7. Protection against contamination. This is scored as DONE if allocation was by community, institution or practice and it is unlikely that the control group received the intervention.
Seven standard criteria are used to assess the methodological quality of CBA studies:

1. Baseline measurement. This is scored as DONE if performance or patient outcomes were measured prior to the intervention and no substantial differences were present across study groups.

2. Baseline characteristics for studies using second site as control. This is scored as DONE if the baseline characteristics of the study and control providers are reported and similar.

3. Blinded assessment of primary outcome(s) (protection against detection bias). This is scored as DONE if the authors state explicitly that the primary outcome variables were assessed blindly OR the outcome variables are objective, e.g. length of hospital stay, drug levels as assessed by a standardised test. Primary outcome(s) are those variables that correspond to the primary hypothesis or question as defined by the authors. In the event that some of the primary outcome variables were assessed in a blind fashion and others were not, each is scored separately.

4. Protection against contamination. For studies using second site as control, this is scored as DONE if allocation was by community, institution or practice and it is unlikely that the control group received the intervention.

5. Reliable primary outcome measure(s). This is scored as DONE if there were two or more raters with at least 90% agreement or kappa greater than or equal to 0.8 OR the outcome data were obtained from some automated system, e.g. length of hospital stay, drug levels as assessed by a standardised test.

6. Follow-up of professionals (protection against exclusion bias). This is scored as DONE if outcome measures were obtained for 80-100% of subjects allocated to groups.

7. Follow-up of patients. This is scored as DONE if outcome measures were obtained for 80-100% of patients allocated to groups or for patients who entered the study.

Seven standard criteria are used to assess the methodological quality of ITS studies:

1. The intervention is independent of other changes. This is scored as DONE if the intervention occurred independently of other changes.

2. There are sufficient data points to enable reliable statistical inference. This is scored as DONE if at least 20 data points are recorded before the intervention AND the authors have done a traditional time series analysis (ARIMA model), OR if at least 3 data points are recorded pre and post intervention AND the authors have done a repeated measures analysis, OR if at least 3 data points are recorded pre and post intervention AND the authors have used ANOVA or multiple t-tests AND there are at least 30 observations per data point.

3. Formal test for trend. This is scored as DONE if a formal test for trend is reported.
4. Intervention unlikely to affect data collection. This is scored as DONE if it is reported that the intervention was unlikely to affect data collection, e.g. sources and methods of data collection were the same before and after the intervention.

5. Blinded assessment of primary outcome(s). This is scored as DONE if the authors state explicitly that the primary outcome variables were assessed blindly or the outcome variables are objective, e.g. length of hospital stay, drug levels as assessed by a standardised test. Primary outcome(s) are those variables that correspond to the primary hypothesis or question as defined by the authors. In the event that some of the primary outcome variables were assessed in a blind fashion and others were not, each is scored separately.

6. Completeness of data set. This is scored as DONE if data set covers 80-100% of total number of participants or episodes of care in the study.

7. Reliable primary outcome measure(s). This is scored as DONE if there were two or more raters with at least 90% agreement or kappa greater than or equal to 0.8 OR the outcome data were obtained from some automated system, e.g. length of hospital stay, drug levels as assessed by a standardised test.
Appendix E: Rank scoring methods

Rank scoring for appraising the clinical importance of benefit (harm)


<table>
<thead>
<tr>
<th>Ranking</th>
<th>Clinical importance of benefit (harm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A clinically important benefit for the full range of plausible estimates. The confidence limit closest to the measure of no effect (the ‘null’) rules out a clinically unimportant effect of the intervention.</td>
</tr>
<tr>
<td>2</td>
<td>The point estimate of effect is clinically important BUT the confidence interval includes clinically unimportant effects.</td>
</tr>
<tr>
<td>3</td>
<td>The confidence interval does not include any clinically important effects.</td>
</tr>
<tr>
<td>4</td>
<td>The range of estimates defined by the confidence interval includes clinically important effects BUT the range of estimates defined by the confidence interval is also compatible with no effect, or a harmful effect.</td>
</tr>
</tbody>
</table>

Title of review:
Title of study:
Author(s):
Year:
Comparators:

Clinically important effect:
Rank Score : /4
Rank scoring for classifying the relevance of evidence


Title of review:

Title of study:

Author(s):

Year:

Comparators:

Rank Score : /4

<table>
<thead>
<tr>
<th>Ranking</th>
<th>Relevance of the evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Evidence of an effect on patient-relevant clinical outcomes, including benefits and harms, and quality of life and survival.</td>
</tr>
<tr>
<td>2</td>
<td>Evidence of an effect on a surrogate outcome that has been shown to be predictive of patient-relevant outcomes for the same intervention.</td>
</tr>
<tr>
<td>3</td>
<td>Evidence of an effect on proven surrogate outcomes but for a different intervention.</td>
</tr>
<tr>
<td>4</td>
<td>Evidence of an effect on proven surrogate outcomes but for a different intervention and population.</td>
</tr>
<tr>
<td>5</td>
<td>Evidence confined to unproven surrogate outcomes.</td>
</tr>
</tbody>
</table>