Fusion or confusion?: challenges in applying critical appraisal methods to the health library literature

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Background

The trinacria (or triskelion) is a symmetrical and cyclical symbol consisting of three bent human legs. It is inextricably associated with the island of Sicily. Pliny the Elder attributes the origin of the triskelion of Sicily to the triangular form of the island, ancient Trinacria, which consists of three large capes equidistant from each other, pointing in their respective directions. The trinacria is also the characteristic attribute of the goddess Minerva, goddess of wisdom, and thus a fitting symbol for the enterprise of librarianship.

Like a twenty-first century trinacria, Evidence Based Librarianship seeks to integrate the three complementary perspectives of user-reported, librarian-observed, and research-derived evidence into a unified vision, thereby improving the quality of professional judgements (Booth and Brice, 2004a). Minerva-like wisdom is required in reconciling the disparate heritages of healthcare, librarianship and research methods to develop robust methods for critical appraisal.

Librarians, as mediators for the knowledge base should be in an ideal position to approach professional practice through the identification, appraisal and application of evidence – so why are they not doing this now?

The profession

Several hypotheses have been put forward to explain why library and information practitioners have been either unwilling or unable to adopt an evidence based approach (Genoni et al, 2004). It has been suggested that librarians place a great emphasis on anecdote and experience, and that this makes them reluctant to give weight to research findings. Another suggestion is that the lack of a high quality evidence base, and a paucity of studies with transferable results, makes it difficult for research to impact on daily practice. A lack of skills and techniques, for example in research design and critical appraisal are also advanced as important barriers. These issues are discussed more fully elsewhere (Genoni et al, 2004). This paper will simply consider briefly the broader context within which the work of this paper is located.

The Evidence Based Practice Process

The stages of evidence based practice are (Booth, 2004):

- Define the problem

- Find the relevant evidence

- Appraise the evidence

- Apply the results of the appraisal

- Evaluate any changes made

- Redefine the problem

Within this process cycle, critical appraisal is a pivotal factor (McKibbon & Bayley, 2004). Critical appraisal is "the process of assessing and interpreting evidence by systematically considering its validity, results and relevance to an individual's work" (Parkes et al, 2004). It has become a key component in the training, and ongoing continuing professional development, of health professionals and others, in a variety of settings.

Critical appraisal sets out to consider the following aspects of a research study:

- Validity - are the results sound?

- Reliability - what are the results?

- Applicability - will the results help me?

Critical appraisal uses **intrinsic** (the design of the study, etc) **not extrinsic** (author, journal, institution) factors in order to help the reader make a judgement about the validity and reliability of the study (Booth & Brice, 2004b).

However, notwithstanding large-scale investment over almost a decade in promoting these skills, a recent randomized controlled trial (RCT) examining critical appraisal training for health professionals found no statistical significant differences in overall attitude towards evidence, evidence seeking behaviour, perceived confidence, and other areas of critical appraisal skills ability (methodology or generalizability) between experimental and control groups. This RCT took as its focus the half-day "one-off" workshops based on the model developed by the Critical Appraisal Skills Programme

(Taylor et al, 2004) typically used to deliver critical appraisal training within the UK
National Health Service.

These results (the trial did find that the overall knowledge score at follow-up and ability
to appraise the results of a systematic review were higher in the critical skills training
group compared to control), led the authors to ask "what are the barriers to successful
delivery and implementation of critical appraisal skills training?" An answer to this
question might help in identifying additional components or course content that can
enhance the effectiveness of the half-day intervention, and assist in finding strategies to
improve the uptake of implementation following such training. A qualitative systematic
review methodology was selected. This methodology has been demonstrated to be
appropriate for exploring barriers and facilitators (Rees et al, 2001) and, indeed, one of
the authors had had recent experience of supervising such an academic project (Lloyd-
Jones, 2004; Lloyd-Jones, 2005).

Objective

To characterise the principal barriers and enablers in the training and subsequent
implementation of critical appraisal skills, knowledge and behaviour.

The overall review is intended to operate at three levels:

- Lessons for health professionals in general;

- Lessons specific to health librarians;

- Lessons that may be transferable to librarians working in other sectors.

This paper will address the second stage of this research, that is specifically to target factors and enablers identified as of particular importance to librarians involved in the critical appraisal process, either as facilitators or recipients of such training, (i.e. What are the barriers and enablers to increase the effectiveness and take-up of critical appraisal skills in health librarians?). Preliminary findings are presented and discussed.

Setting

Librarians working in health care, appraising health care literature and health library-related literature in English.

Methods

The authors located and reviewed published and unpublished accounts of health librarian involvement in critical appraisal activities in order to characterise the principal barriers in the training and subsequent implementation of critical appraisal skills, knowledge and behaviour. This was complemented by a broader survey of critical appraisal enablers within a healthcare setting.

Outcomes

Relevant outcomes were identified as including educational satisfaction after teaching critical appraisal for both the pupil and the teacher; demonstration of proficiency in critical appraisal skills; change in behaviour of health professional/health care user after critical appraisal teaching. The authors were particularly interested in whether librarians are getting increasingly involved in critical appraisal activities and if not, why not?

Search strategy

A comprehensive search was undertaken in the main Library and Information databases, LISA and Library Literature; key healthcare databases Medline, CINAHL and Embase; ERIC; Emerald, and the Science, and Social Science Citation Indexes. Keywords included "critical appraisal", "evidence based medicine", evidence based healthcare", "evidence based practice" and "evidence based librarianship". In addition a range of related health care databases and Internet resources were searched, a full list can be found in Appendix 2.

Inclusion and exclusion criteria

This stage of the review was limited to qualitative studies to ensure that barriers and facilitators are identified as such, either by the practitioners themselves or by other stakeholders. Studies using mixed methods were included only if qualitative findings were reported and discussed separately from the non-qualitative findings. Studies from any country were eligible for inclusion, allowing comparisons between countries at different levels of familiarity with critical appraisal methods.

For studies to be included in the thematic analysis of barriers they had to specifically include mention of librarian involvement – either in supporting the evidence based practice of others (evidence based healthcare) or in their own evidence based practice (evidence based librarianship/evidence based information practice). The authors worked from the assumption that there is a clear correspondence between the experiences of librarians in either context. For studies to be included in the thematic analysis of enablers, however, a more liberal inclusion criterion was employed. It was assumed that interventions tried in a more generic setting, or with other professional groups, could still

be usefully identified as enablers even if these had not been specifically mentioned or trialled in the specific context of health librarians. In this way the review would provide the widest possible overview of possible ways to resolve identified barriers.

Studies were excluded if:

- They describe the development and/or use of critical appraisal tools without reference to critical appraisal teaching or training;
- They describe critical appraisal of a particular topic area;
- They describe critical appraisal as an individual activity without reference to group processes.

Two reviewers independently selected the studies to be included in the review according to the agreed criteria. Any disagreement was settled by negotiation.

Assessment of study quality

There is no absolute list of criteria for assessing the quality of qualitative research studies (Popay et al. 1998). Indeed recently it has been proposed that assessment of study quality for qualitative studies is not necessary as a prerequisite for thematic analysis unless studies are actually to be underlineexcluded on the basis of quality (Mays et al, 2005). Instead assessment of study quality can be included within the discussion as a possible mitigator of the robustness of findings. It was therefore decided to include all eligible studies in the thematic analysis.

Data Extraction

Data extraction was completed independently by the two authors, to produce tables including bibliographic details, contextual features of each included study and word-for-word quotations from the text. Textual quotations were only included if they were felt to have a direct bearing on the review question.

Data analysis

Study findings were analysed and combined using meta-ethnography (Noblit & Hare, 1988), a systematic and explicit approach for analysis of qualitative data derived from primary studies. Meta-ethnography involves selecting relevant studies to be synthesised, reading them repeatedly and noting down key concepts (or "metaphors"). These key concepts are the raw data for the synthesis. The intent is then to identify "synthesised concepts" that encompass more than one of the studies being synthesised. Such synthesised or "manufactured" concepts may not be explicitly identified in any of the original studies but are continually tested for their validity by comparison with additional studies. They may ultimately be used to construct a model or framework which attempts to present both the concepts themselves and relationships between them (Britten et al, 2003).

Three different types of synthesis are used to produce insights. The simplest identifies where accounts contained in different papers are similar and synthesis can be achieved through "reciprocal translation". Conversely, accounts may conflict in which case a "refutational synthesis" is produced. The third and most complex form of synthesis is a "line of argument synthesis" which attempts to relate the emerging parts of the synthesis into a single whole.

Key enablers and barriers were identified following synthesis of the studies identified. In addition the experiences of participants who have shared in the Critical Skills Training in Appraisal for Librarians (CriSTAL) courses since they were first developed in 1999 (user-reported) (Booth and Brice, 2003) were also analysed. Finally lessons from the authors' own experience (librarian-observed) were used to consider the implications for further research and for practice.

Results

Number and type of studies

12 relevant studies have been included in this preliminary analysis. A further 138 studies are currently being analysed and their findings incorporated into the full thematic analysis (Appendix 1).

Findings

Table 1 Barriers identified from the literature

Theme	Example	Reference
Access to evidence base	"problems were noted in gaining access to a relevant resource base"	[Booth & Brice, 2003]
Lack of appraisal examples	"currently there is no single, freely available source in which to find pre-appraised articles about librarianship"	[Crumley & Koufogiannakis 2002]
Lack of appraisal skills	"very few information professionals have undergone the intensive generic workshops to prepare them for facilitating the development of appraisal skills".	[Booth & Brice, 2002]
Lack of clinical knowledge	"This survey suggests that the major reasons why CLs (Clinical Librarians) might not routinely construct fully appraised search results are lack of time and clinical knowledge".	[Ward, 2005]
Lack of confidence	"confidence appears to decline after initial training, indicating that it is only *after* training that some realise that critical appraisal in practice may be more difficult than it seemed at first"	[Urquhart et al, 1999]
Lack of knowledge of medical technology	"their medical terminology knowledge was inadequate"	[Cimpl, 1985]
Lack of knowledge of statistical methods	"knowledge gaps … particularly in the areas of study design and statistical methods"	[Scherrer & Dorsch, 1999]
Lack of knowledge of study design	"knowledge gaps … particularly in the areas of study design and statistical methods"	[Scherrer & Dorsch, 1999]
Lack of recognition	"in the absence of partnerships …. librarians feel their professional expertise may not be recognized or appreciated"	[Murphy, 2000]
Lack of time	"This survey suggests that the major reasons why CLs (Clinical Librarians) might not routinely construct fully appraised search results are lack of time and clinical knowledge".	[Ward, 2005]
Non-acceptance of change of role	"Even some veteran librarians felt uncomfortable with the new roles they were being asked to assume: teaching EBM skills, quality filtering of literature, and participating in journal clubs and morning report".	[Scherrer and Dorsch, 1999]
Not research	"we continue to not regard ourselves as a research-	[Grant 2003]

based profession	orientated profession"	
Uncertainty of impact of critical appraisal on roles	Later studies….vindicated observations at the Health Libraries Group conference in 1996 when it was clear from discussions and questions at one session that many librarians were very fearful of the implications of critical appraisal for them in roles for user education and support.	[Urquhart et al, 1999]

Table 2 Enablers identified from the literature

Theme	Example	Reference
Acceptance of new roles	EBM requires the librarian to identify, select, evaluate, and synthesize literature. Traditionally responsible for only the first part of the information process, identification of the literature, EBM offers librarians the opportunity to participate fully in the information process. To do so, ***librarians will need to engage in a concerted effort to accept new roles and acquire new skills***	[Scherrer & Dorsch, 1999]
Confidence when faced with uncertainty	" for librarians to feel comfortable practising EBL they need to know that it is acceptable to discover holes in the literature, but still be able to make decisions based upon their experience and the availability of research"	[Crumley & Koufogiannakis 2002]
Continuing professional development	" Continuing professional development (CPD) opportunities (e.g. in basic anatomy and physiology, research methodology and critical appraisal) could influence change in this respect….The training needs identified by respondents could form the basis for the development of training packages for CLs and encourage a change in opinion concerning the provision of evaluated search results".	[Ward, 2005]
Critical appraisal of EBL literature	"A useful spin-off from librarians acquiring critical appraisal skills within their own professional context might be that they would then feel more able to facilitate similar sessions with multi-disciplinary groups within their organisation"	[Booth & Brice, 2003]
Exposure to clinical context	"Attendance at morning report exposes the librarians to medical terminology, plunges them into the same learning environment as the residents, and introduces them to complex patient histories. Hearing unfamiliar medical terminology forces librarians to learn new vocabulary to understand clinical discussions better. Seeing residents challenged to make diagnosis and treatment decisions under the various pressures of morning report increases librarians' understanding of the environment in which physicians work".	[Scherrer & Dorsch, 1999]
Graduate education	"Finally, a dialogue is beginning with library science educators on how graduate schools might redesign curricula to prepare librarians for future work in EBM settings".	{Scherrer & Dorsch, 1999]
Inclusion in the patient care team	"EBM brings clinical librarians into full participation in the problem-solving process. It expands the role of	[Scherrer & Jacobson, 2002]

	the librarian from defining the question and searching for relevant articles, to include critically appraising the literature in terms of study design, statistical analysis, and applicability to the individual patient. Librarians become integral members of patient care teams".	
Informationist role in practice	"Informationists …would function as members of health care teams, providing information at the point of care. While not necessarily defined as librarians, informationists would learn "the practical, working skills of retrieving, synthesising, and presenting medical information and the skills of functioning in a clinical care team. These skills are remarkably similar to ones proposed in the health sciences library literature"	[Scherrer & Dorsch, 1999]
Mentoring	Several interventions were initiated to accomplish these objectives: a summer series of EBM professional development programs was scheduled; an EBM round table was established to which all librarians, affiliated hospital librarians, and several representatives from the College of Medicine were invited; a mentoring system with particular emphasis on library residents was set in place; and formal continuing education was encouraged".	[Scherrer and Dorsch, 1999]
Modelling of informationist role	"Davidoff's introduction of the concept of the 'informationist' has opened the debate about the new roles that health librarians/health information professionals could (some would say *should*) take on"	[Ward, 2005]
Multidisciplinary working	"The intangible rewards of working with other librarians, medical residents, and…faculty were felt to be real and significant"	[Scherrer & Dorsch, 1999]
Ongoing support	"Sustained support is necessary for critical appraisal skills training - one-off training does not seem sufficient to ensure vocational trainees gain confidence"	[Urquhart et al, 1999]
Organisational support	"that this effort was administratively supported also contributed to its success …..this co-operation addressed the issue of deficiencies in the background of the librarians, especially in the area of statistics"	[Scherrer & Dorsch, 1999]
Partnerships	"Librarians and GP trainers need to work together to ensure that opportunities for continued support in critical appraisal skills are taken up".	[Urquhart et al, 1999]
Provision of checklists	"checklists, which are becoming increasingly popular, can be useful tools for critically appraising the evidence…….the appraisal tool, together with the	[Booth and Brice, 2004]

	workshop format, helped participants improve their understanding of research methods and their ability to use research to aid their decision making"	
Tools and glossaries	"Suggested solutions involve use of tools, worksheets and glossaries of terminology to enable participants to get the most from learning possibilities in the workshop".	[Booth and Brice, 2004]
Training in study design and statistics	Feelings of competence and professional satisfaction, while not formally measured, were enhanced. Librarians became more proficient in searching and filtering the literature after they came to understand the significance of study design, levels of evidence, and statistical concepts found in the clinical literature.	[Scherrer & Dorsch, 1999]

Synthetic (second-level themes)

From the themes identified above, as grounded in the literature, the authors were able to characterize four different categories of barriers with regard to the application of critical appraisal skills by health librarians. These barriers matched fairly closely four corresponding categories of enablers, again identified broadly from the literature (Table 3).

Table 3 Second level themes identified from the literature

Barriers	Enablers
• Personal characteristics	• Self Efficacy
• Environment	• Training
• Technical Knowledge	• Structure and resources
• Role expectations	• Vision and marketing

Discussion

Discussion of Barriers

Personal Characteristics

While it is invidious to generalise there is concern, reflected in the literature, regarding whether healthcare librarians possess the personal attributes required for them to be independent practitioners within evidence based healthcare. Typical healthcare librarian involvement in training focuses on the acquisition of skills and knowledge with the librarian taking a didactic role. In contrast training in a critical appraisal context requires a primarily facilitative role and the ability to handle uncertainty, both for the facilitator and for their group.

Technical Knowledge

Frequent mention is made in the literature of the need for librarians to acquire knowledge of research design and statistics. Librarians are by no means unique in requiring this "technical knowledge"– indeed within the wider literature Devonport and colleagues (2003) report how "students tend to cope with statistics using avoidance coping strategies" (Devonport et al., 2003). Other commentators report that "students find statistics difficult" (Lane et al., 2002) and how "low confidence corresponds with poor performance" (Lane & Lane, 2001).

Role Expectations

Although skills in interpreting the literature can be viewed as a natural extension of the repertoire of literature based skills typically possessed by librarians, there is evidence from studies examined to date that many view these skills as lying outwith the librarian's role. This is certainly true of commentators from outside the profession who persist not only with the view that librarians are exclusively literature searchers but also with the idea that librarians are library-based. However it is also true of early writings on involvement with evidence based healthcare from within the profession. More recent

literature focuses not so much on the specific challenges of critical appraisal but more on the difficult nature of the new roles in general and the associated work involved.

Environment

Lack of time is consistently seen as one of the principal environmental barriers to greater involvement in critical appraisal. For many librarians, except where posts have been purposefully created, specific involvement in evidence based healthcare has not been accompanied by associated reduction of more typical health library workload. Health librarians also have to contend with isolation from the clinical environment, requiring that opportunities be manufactured to allow their insertion into the context within which critical appraisal can be practised. This specific difficulty is allied with a more general organisational environment in which staff who are not clinical are often excluded from team meetings. There are issues too with regards to the availability, level and quality of evidence base, although this is more pronounced a factor within the library literature than within healthcare, and with the perceived research-practice gap mentioned earlier.

Discussion of enablers

Self Efficacy

Within a context where librarians must feel comfortable and capable of active participation in critical appraisal, recent interest in self-efficacy is most appropriate. In a recent report on healthcare librarian continuing professional development, Urquhart and colleagues (2005) state: "self-efficacy is affected by 'performance accomplishments' (trial successes), vicarious experience (modelling of activities), verbal persuasion (suggestions, self-instruction) and emotional arousal (relaxation, biofeedback)".

Achievement of self-efficacy is a natural counterpoint to the identified barrier of *personal characteristics.*

Training

Approaches to training are proposed as a means to address the barrier of *technical skills*. Suggestions include both librarian-specific training such as CriSTAL style programmes in critical appraisal of the library literature, and its adjunct "Statistics for Petrified Librarians (STAPL)" and more general, multi-disciplinary training. Other non-group approaches include both blended learning and mentoring by experienced colleagues.

Visioning and Marketing

While approaches involving self-efficacy and training may be viewed as generic, challenging the *role expectations* of librarians and those that they serve requires profession-specific initiatives such as visioning and marketing. Suggested approaches include modelling of librarian evidence based healthcare roles (for example, at EBHC Workshops, new roles that challenge prejudices and preconceptions (e.g. The Informaticist/Clinical Librarian/Information Specialist in Context) influential position statements (such as those of the CILIP Health Expert Advisory Group (UK) and the Medical Library Association (US) Research Statement. Finally involvement in Evidence Based Information Practice provides opportunities for librarians to model what they teach in a more familiar context.

Structures and Resources

The final enabler, provision of appropriate structures and resources, as with the first two, is not profession-specific but is shared with other healthcare professions. This is intended to counter *environmental barriers*. It includes such measures as legitimisation of reading

time, inclusion of research into practice activities in job descriptions and staff appraisal

processes, provision of journal clubs, production of evidence based summaries

(CATS/BestBets etcetera) and participation in Ward Rounds or Morning Reports.

Conclusion

This paper belongs within the context of the authors' wider exploration of barriers to

critical appraisal experienced by all healthcare practitioners. For pragmatic reasons the

authors have restricted their initial focus on barriers to involvement in critical appraisal

by healthcare librarians. However where it comes to discussion of enablers, sources used

include the wider healthcare literature. This has enabled the authors to model the intended

overall review process and to examine whether it is possible to apply critical appraisal

methods developed within healthcare to the library setting. Barriers identified specifically

within the literature on healthcare librarian involvement certainly share many

characteristics identifiable from the involvement of healthcare professionals in critical

appraisal. Correspondingly, the enablers identified from the wider healthcare literature

certainly seem to have the potential to address the specific problems identified for

healthcare librarians.

Time constraints have also required that thematic analysis to date focuses on the

identification of themes that are common to one or more studies (the most simple level of

synthesis). This will be followed by a specific investigation of refutational findings that

conflict with this preliminary analysis. Finally the authors plan to construct a framework

that examines relationships (line of argument) between the currently independent "second

level" categories and further examines the relationship between barriers and enablers.

Findings from both these processes will be written up in late 2005 in a major peer-reviewed journal.

Findings from the review so far raise a number of issues. For instance the findings relate largely to librarians appraising medical literature in their support of EBHC rather than of their own evidence base, as little research has been identified that reports on this aspect in particular. In addition, there is less data available to populate the higher levels of evidence (defined by our coding framework as direct reports from participants). This reliance on mediated comments and interpretations through the eyes of researchers or commentators should lead to caution in interpreting the results.

The authors also experienced poor reporting of studies, which meant that significant time was spent retrieving irrelevant papers. This was compounded by the lack of structured abstracts. Another issue for the library profession concerns the fragmentation of the evidence base relating to library questions, and the inaccessibility of potentially relevant databases and indexing and abstracting services.

Upon conclusion of the analysis reported in this paper, the next phase of the review will consider whether there is greater homogeneity between health professionals and health librarians (what the authors term "sector homogeneity") or between health librarians and other librarians (what the authors label "professional homogeneity"). Answers to this, and related issues, will help in the future design of critical appraisal programmes for health librarians and for the library profession in general.

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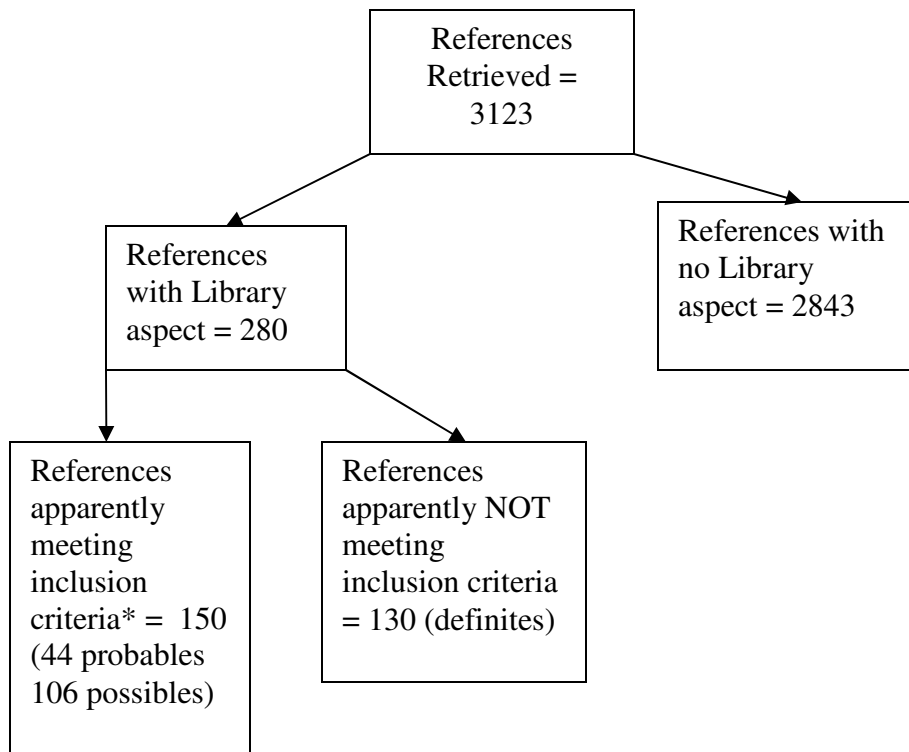Department of Information Studies, University of Wales Aberystwyth, May 2005.

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Appendix 1: Flow Diagram for Article Selection

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│   References     │  │   References     │
│   apparently     │  │   apparently NOT │
│   meeting        │  │   meeting        │
│   inclusion      │  │   inclusion      │
│   criteria* = 150│  │   criteria       │
│   (44 probables  │  │   = 130 (definites)│
│   106 possibles) │  │                  │
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* Based on abstract screening only

Appendix 2: Databases searched

1. Trip database http://www.tripdatabase.com

2. Physiotherapy Evidence Database http://www.pedro.fhs.usyd.edu.au

3. OT Seeker http://www.otseeker.com/

4. McMaster University Evidence-Based Practice Group http://www-fhs.mcmaster.ca/rehab/ebp

5. Medline

6. Embase

7. CINAHL

8. Science Citation Index

9. Social Science Citation Index

10. LISA

11. Library Literature

12. Emerald

13. ERIC

14. The Cochrane Library

15. Cochrane Database of Systematic Reviews (CDSR)

16. Database of Abstracts of Reviews of Effectiveness (DARE)

17. The Cochrane Controlled Trials Register (CCTR)

18. Dissertation Abstracts

19. C2-SPECT

20. Other evidence-based practice sites identified from Google, Yahoo and Copernic

     search engines

21. Reference lists and content experts will be contacted to provide additional critical

     appraisal initiatives.

22. Citation searching