SCHOLARLY PAPER

# The JBI model of evidence-based healthcare

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## Abstract

Evidence-based healthcare as it is contemporarily conceived is based on the view that clinical decisions should be based on the best available scientific evidence but recognising patient preferences, the context of healthcare and the judgement of the clinician. The ongoing debate on the nature of evidence for practice across all of the health professions is influenced by the experience of clinicians in everyday practice who, in using the evidence, assert that there are diverse sources of research-based and non-research-based evidence and that the process of evidence-based practice should be placed within a broader context that is grounded in practice; recognises different evidentiary bases; and is directed towards improving global health across vasty different practice contexts.

We present a developmental framework of evidence-based practice that builds and expands on the work of leaders in the field of evidence-based healthcare; is contextualised; is inclusive of diverse forms of evidence; and incorporates understandings of knowledge transfer and utilisation. The conceptual model attempts to situate healthcare evidence and its role and use within the complexity of practice settings globally.

**Key words:** evidence-based healthcare, evidence-based medicine, evidence synthesis, evidence transfer, evidence utilisation.

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## Introduction

Evidence-based healthcare is gaining increasing acceptance in most Westernised countries and the science of evidence synthesis is continually evolving and expanding. Over a number of years working as an evidence-based healthcare research group observing – and participating – in the ongoing international dialogue, we have explored the nature of evidence in its generic sense and engaged in the development of a conceptual framework for evidence-based practice that is inclusive of diverse sources of research-based and non-research-based evidence and places the process of evidence-based practice within a broader context that is both grounded in practice and directed towards improving global health.

Contemporary understandings of evidence-based healthcare practice focus on the need for all health professionals to practise in ways that are supported by the most up-to-date evidence or knowledge available and concur with the definition of Sackett and colleagues as:

> The conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients. The practice of evidence based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research.[1]

Sackett and Rosenberg[2] argue for the need to base medical practice on the best possible evidence; to critically appraise research reports for validity and usefulness; and to incorporate the rapidly growing body of evidence into medical practice. They suggest that evidence-based medicine is concerned with five linked ideas:

1. Clinical and other healthcare decisions should be based on the best patient population and laboratory-based evidence.
2. The nature and source of the evidence to be sought depends on the particular clinical question.
3. The identification of the best available evidence requires the application of epidemiological, economic and biostatistical principles plus pathophysiology and personal experience.
4. This identification and appraisal of the evidence must be acted upon.
5. There should be continuous evaluation of performance.

There are a number of models that attempt to represent the components of evidence-based healthcare to facilitate understanding, analysis, improvement and/or the replacement of the process as it is currently conceived, purported and practised. The Star Model of Knowledge Transformation, for example, is 'a simple, parsimonious depiction of the relationships between various stages of knowledge transformation, as newly discovered knowledge is moved into practice'. Configured as a simple five-point star, the model consists of five stages of knowledge transformation:

- knowledge discovery;
- evidence summary;
- translation into practice recommendations;
- integration into practice; and
- evaluation.[3]

Similarly, Dawes and colleagues[4] present five stages of evidence-based healthcare:

- the translation of uncertainty to an answerable question;
- the systematic retrieval of the best evidence available;
- the critical appraisal of evidence for validity, clinical relevance and applicability;
- the application of results in practice; and
- the evaluation of performance.

Titler and Everett also see the use of evidence as pivotal to understanding the evidence-based practice approach and cite the Rogers' diffusion of innovation model as a useful conceptual guide. This model, when applied to the use of evidence-based guidelines, addresses four areas:

- the characteristics of the guideline;
- the users of the guideline;
- the methods of communicating the guideline; and
- the social system in which it is being adopted.[5]

The term 'research utilisation' is used to describe processes akin to those of evidence-based healthcare, such as in the Stetler Model of Research Utilisation. The Stetler Model applies research findings at the individual practitioner level. The model has six phases: preparation, validation, comparative evaluation, decision-making, translation, and application and evaluation.[6–9] Dobrow *et al.*[10] have developed a conceptual framework for evidence-based decision-making arising out of a well-constructed critique of the current, dominant view of evidence-based practice. They suggest that prevailing conceptions of evidence-based practice are overly focused on '. . . a scientific conception of evidence – evidence developed through systematic and methodologically rigorous clinical research, emphasising the use of science while de-emphasising the use of intuition, unsystematic clinical experience, patient and professional values, and pathophysiological rationale'. This, they argue, is too narrow and ignores other sources of evidence or relevance to clinical decision-making. Their 'model' describes axes of evidence-based decision-making to describe the relationship between evidence and context. 'Evidence axis' describes the scientific evidence sourced to inform a clinical decision and 'context axis' describes

contextual factors that inform the decision. They assert that evidence-based practice is currently focused on the evidence axis and pays little attention to the way that context impacts on evidence-based decision-making.

Our model of evidence-based healthcare is developmental and, building on frameworks that have evolved, it has been constructed out of our experience with the evidence-based practice field; our emerging international work with the Joanna Briggs Institute and the international Collaborating Centres of the Joanna Briggs Collaboration; our involvement in disseminating, implementing and evaluating evidence-based guidelines in clinical settings; and our examination of the scientific and professional literature.

## The JBI model of evidence-based healthcare

The *JBI model of evidence-based healthcare* conceptualises evidence-based practice as clinical decision-making that considers the best available evidence; the context in which the care is delivered; client preference; and the professional judgement of the health professional. The model depicts the four major components of the evidence-based healthcare process as:

**1** healthcare evidence generation;
**2** evidence synthesis;
**3** evidence (knowledge) transfer; and
**4** evidence utilisation.

Each of these components is modelled to incorporate their essential elements; and the achievement of improved global health is conceptualised as both the goal and end-point of any or all of the model components and the raison d'être and driver of evidence-based healthcare (Fig. 1).

Evidence-based healthcare is represented as a cyclical process that derives questions, concerns or interests from the identification of global healthcare needs by clinicians or patients/consumers and then proceeds to address these questions by generating knowledge and evidence to

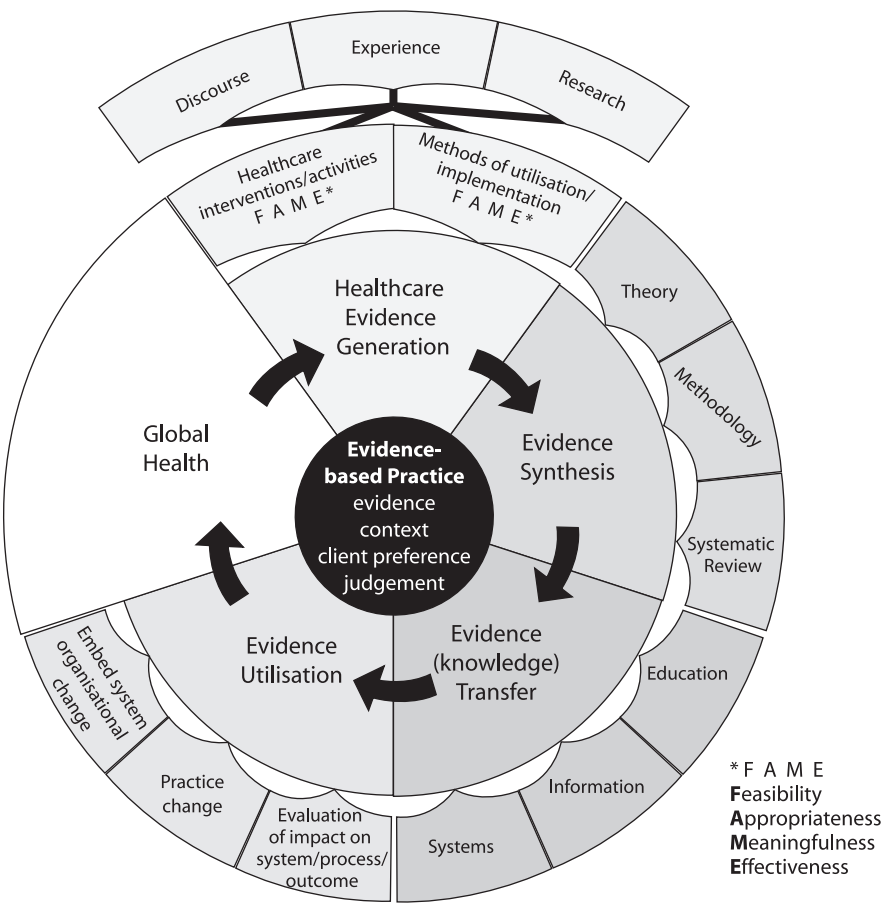


**Figure 1** Conceptual model of evidence-based healthcare.

effectively and appropriately meet these needs in ways that are feasible and meaningful to specific populations, cultures and settings. This evidence is then appraised and synthesised and transferred to service delivery settings and health professionals who then utilise it and evaluate its impact on health outcomes, health systems and professional practice.

## Healthcare evidence generation

There is ongoing debate on the meaning of evidence when attaching this epithet to healthcare. According to Humphris, the term 'evidence based' in healthcare 'implies the use and application of research evidence as a basis on which to make healthcare decisions, as opposed to decisions not based on evidence'.[11] However, 'evidence' is a complex concept that warrants examination as it means different things to different people. In its most generic sense it is defined as being 'the available facts, circumstances, etc. supporting or otherwise a belief, proposition, etc. or indicating whether a thing is true or valid'.[12] A less common meaning ascribed to evidence by Pearsall and Trumble is that of clearness or obviousness.[12] From a philosophical standpoint, the concept of evidence plays a key role in our understanding of knowledge and rationality. Traditionally, 'one has knowledge only when one has a true belief based on very strong evidence'.[13] Moreover, for belief to be rational it must be based on adequate evidence, even where that evidence is insufficient to ground knowledge. Within the empirical sciences, the standing of a given theory or hypothesis is entirely dependent on the quantity and character of the evidence in its favour. It is the relative weight of supporting evidence that allows us to choose between competing theories. Within the empirical sciences, the process of knowledge generation involves testing a hypothesis or a set of hypotheses by deriving consequences from it and then testing whether those consequences hold true by experiment and observation.

The term 'evidence' is used in the model to mean the basis of belief; the substantiation or confirmation that is needed in order to believe that something is true.[14] Health professionals seek evidence to substantiate the worth of a very wide range of activities and interventions and thus the type of evidence needed depends on the nature of the activity and its purpose.

### Evidence of 'feasibility'

Feasibility is the extent to which an activity is practical and practicable. Clinical feasibility is about whether or not an activity or intervention is physically, culturally or financially practical or possible within a given context.

### Evidence of 'appropriateness'

Appropriateness is the extent to which an intervention or activity fits with or is apt in a situation. Clinical appropriateness is about how an activity or intervention relates to the context in which care is given.

### Evidence of 'meaningfulness'

Meaningfulness is the extent to which an intervention or activity is positively experienced by the patient. Meaningfulness relates to the personal experience, opinions, values, thoughts, beliefs and interpretations of patients or clients.

### Evidence of 'effectiveness'

Effectiveness is the extent to which an intervention, when used appropriately, achieves the intended effect. Clinical effectiveness is about the relationship between an intervention and clinical or health outcomes.

The *healthcare evidence generation* component of the model identifies discourse (or narrative), experience and research as legitimate means of evidence or knowledge generation (Fig. 2).

The means of generation are linked to the purpose of evidence generation in evidence-based healthcare – that is, to establish the feasibility, appropriateness, meaningfulness or effectiveness of an intervention, an activity or a phenomena in relation to both healthcare and methods of utilisation evidence and, thus, changing practices. Any indication that a practice is effective, appropriate, meaningful or feasible – whether derived from experience or expertise or inference or deduction or the results of rigorous inquiry – is regarded

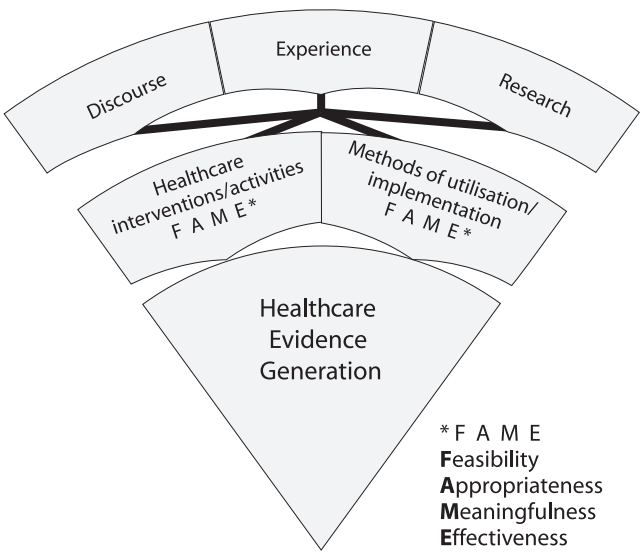


**Figure 2** Healthcare evidence generation.

as a form of evidence in the model. (The results of well-designed research studies grounded in any methodological position are seen to be more credible as evidence than anecdotes or personal opinion; however, when no research evidence exists, expert opinion is seen to represent the 'best available' evidence).

## Evidence synthesis

*Evidence synthesis* – the evaluation or analysis of research evidence and opinion on a specific topic to aid in decision-making in healthcare – is conceptualised as consisting of three elements in the model: theory, methodology and the systematic review of evidence (Fig. 3).

Although the science of evidence synthesis has developed most rapidly in relation to the meta-analysis of numerical data linked to theories of cause and effect, the further development of theoretical understandings and propositions of the nature of evidence and its role in healthcare delivery and the facilitation of improved global health is identified as an important element of this component of the model. Similarly, the increasing, ongoing interest and theoretical work on methods of synthesizing evidence from diverse sources are depicted as an element of evidence synthesis.

The third element of evidence synthesis is the operationalisation of methods of synthesis through the systematic review process. This element in the model is grounded in the view that evidence of feasibility, appropriateness, meaningfulness, effectiveness and economics are legitimate foci for the systematic review process; and that diverse forms of evidence (from experience, opinion and research that involves numerical and/or textual data) can be appraised, extracted and synthesised.[15]

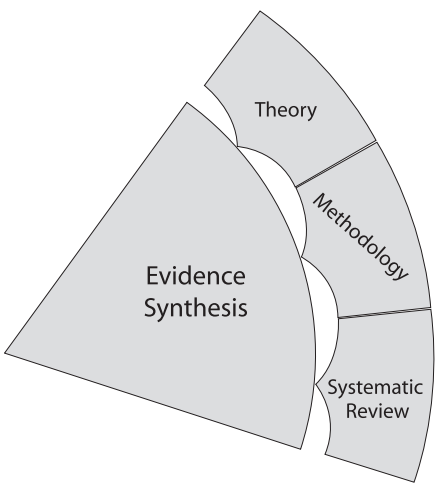


**Figure 3** Evidence synthesis.

The systematic review and the synthesis of findings have their origins in quantitative psychology and the classical randomized controlled trial approach to clinical research in the health science fields. The JBI model of evidence-based healthcare adopts a pluralistic approach to the notion of evidence whereby the findings of qualitative research studies are regarded as rigorously generated evidence and other text derived from opinion, experience and expertise is acknowledged as forms of evidence when the results of research are unavailable.

The core of evidence synthesis is the systematic review of the literature on a particular condition, intervention or issue. The systematic review is essentially an analysis of all of the available literature (i.e. evidence) and a judgement of the effectiveness or otherwise of a practice, involving the following steps:

1. The development of a rigorous proposal or protocol. The review protocol provides a predetermined plan to ensure rigour and minimise potential bias. It also allows for periodic updating of the review if necessary. All of the stages of the review (as listed below) are described fully in the protocol, and it is usually subjected to peer review before the review commences.
2. Stating the questions or hypotheses that will be pursued in the review.
3. Identifying the criteria that will be used to select the literature.
4. Detailing a strategy that will be used to identify all relevant literature within an agreed time frame.
5. Establishing how the quality of each study/paper will be assessed or critically appraised and any exclusion criteria based on quality considerations.
6. Detailing how data will be extracted from the primary research or text.
7. Setting out a plan of how the data extracted will be synthesised.

Systematic reviews occupy the highest position in current hierarchies of evidence because they systematically search, identify and summarize the available evidence that answers a focused clinical question with particular attention to the methodological quality of studies or the credibility of opinion and text. The model is premised on a pluralistic approach to evidence synthesis that is inclusive of evidence that arises out of quantitative research; qualitative research; opinion and discourse; and economic analyses.

### The synthesis of the results of quantitative research

Statistical analysis (meta-analysis) may or may not be used in synthesising numerical data and this depends on the

nature and quality of studies included in the review. Meta-analyses of numerical findings provide precise estimates of an association or a treatment effect in reviews of effectiveness through the statistical synthesis of multiple studies. Key outcomes of the meta-analysis are the measure of effect, the confidence interval and the degree of heterogeneity of the studies synthesised. A variety of statistics may be used to achieve the summary measure of effect. For dichotomous outcome data odds ratios, Peto odds ratios, relative risk or risk difference may be used. Combining continuous data standardised or weighted mean differences are options. For most of these statistics a Random or Fixed effects model must be chosen. The choice of which statistic to use in a given circumstance is not without debate. The confidence interval, conventionally 95%, provides a range within which the measure of effect lies for a given degree of certainty. The tests for heterogeneity between the combined results using standard chi-square test convey the level of similarity between the study results. In some cases the difference is too great and it indicates that meta-analysis is not appropriate.[16]

### The synthesis of the results of qualitative research

The term 'meta-synthesis' is a neologism that refers to a 'higher form of synthesis' or, as Light and Pillemer[17] refer to it, the 'science of summing up'. Meta-synthesis is a process of combining the findings of individual qualitative studies (i.e. cases) to create summary statements that authentically describe the meaning of these themes (or cross-case generalisations). It is an interpretive process but requires transparency of process and requires reviewers to identify and extract the findings from papers included in the review; to categorise these study findings; and to aggregate these categories to develop synthesised findings. Thorne *et al.*[18] claim that there is a '. . . new enthusiasm for qualitative meta-synthesis as an enterprise distinct from conventional literature reviews, secondary analyses, and the many other scholarly endeavors with which it is sometimes confused'. They present, as recognized scholars in the field of qualitative research, the five different methodological approaches they have developed for the meta-synthesis of the findings of qualitative research and increasing sophistication in the synthesis of evidence that is not statistical. Noblit and Hare[19] have contributed significantly to the emergence of robust debate on the synthesis of the findings of qualitative research within the context of the systematic review and its role in evidence-based practice. Their work on meta-ethnography arose out of a need to synthesise the findings from school inspection reports within the context of education. Meta-ethnography involves the identification of studies that exhibit similarity in approach, method and focus of interest and then employing an iterative process of analysis based on the constant comparative method of grounded theory.[20]

### The synthesis of evidence arising out of expert opinion and text

Although the proponents of evidence-based healthcare would argue that the results of high-quality research are the only source of evidence for practice, this has drawn considerable criticism from clinicians. Clinicians argue that the nature of everyday practice demands an eclectic, pragmatic approach to conceptualising evidence. The 'consumers' of systematic reviews – those who practise within the health system – regard the opinion of experts and the views of experienced clinicians and their professional bodies as valid forms of evidence for practice, especially when some intervention or activity is required in practice, even if no evidence from research exists. Clinicians argue that they cannot cease to respond to patient/client needs if these needs and appropriate or effective responses to them have not yet been well researched. The pragmatics of practice require clinicians to adopt a perspective that works and is the most appropriate in the circumstances.

The process seeks to locate the major conclusions in text that represent credible opinion. Approaches to critically appraise such nebulous, and often conflicting, data will always be at best tentative. This is not, however, sufficient for an objection to rule out the use of a transparent process designed to identify the best available evidence for practice when results of research are not available. Appropriate sources of such evidence are therefore any text in which an informed opinion on the benefits or otherwise of an intervention or practice is manifested, that is, any statement in a particular medium such as a journal article, book, report or guideline that represents a discourse that informs practice that emanates from a source that is regarded as authoritative by practitioners. The assessment of validity focuses on:

- examining the opinion;
- identifying the credibility of the source of the opinion;
- establishing the motives that underlie the opinion; and
- locating alternative opinions that give credence to it or, conversely, question it.

Validity in this context therefore relates to what is being said, the source and its credibility and logic; and consideration of the overt and covert motives at play. As in the synthesis of qualitative research studies, the meta-synthesis is an interpretive process but requires transparency of process and

requires reviewers to identify and extract the conclusions from papers included in the review; to categorise these conclusions; and to aggregate these categories to develop synthesised findings.

### The synthesis of evidence arising out of economic analyses

The synthesis of economic analyses or evaluations is a developing science. The lack of standardization of systematic review methods is incongruous with the obvious need for these methods and the availability of existing effectiveness review methods that may be adapted in terms of searching, critical appraisal and data extraction.[21] Because of the paucity of high-quality studies and established methods to statistically synthesise studies, meta-analysis is currently not widely used to synthesise economic findings; however, it is still obviously useful to extract data from high-quality studies and present a summation of the results in a way that informs practice. There are a number of options such as the use of a narrative summary or a tabular summary but there are a number of systematic reviews that incorporate economic analysis to synthesise the findings of two or more studies.[22] Syntheses of economic evidence can provide important information for healthcare decision-makers and there is ongoing work that identifies '. . . the promise, difficulties, and current limitations of the use of economic analyses by health care decision makers'.[22]

## Evidence (knowledge) transfer

This component of the model is conceptualised as the act of transferring knowledge to individual health professionals, health facilities and health systems globally by means of journals, other publications, electronic media, education and training and decision support systems. Evidence transfer is seen to involve more than disseminating or distributing information and to include careful development of strategies that identify target audiences – such as clinicians, managers, policy-makers and consumers – and designing methods to package and transfer information that is understood and used in decision-making. Fundamental to this process is:

- developing understandable and actionable messages;
- accommodating the context of a target audience's information needs; and
- delivering messages in cost-effective ways (including information technology, print material, meetings, workshops and training programs).

The model therefore depicts three major elements of *evidence (knowledge) transfer* – education and training, information delivery and the transfer of evidence though organisational and team systems (Fig. 4).

## Evidence utilisation

This component of the model relates the implementation of evidence in practice, as is evidenced by practice and/or system change. It identifies three elements: practice change; embedding evidence through system/organisational change; and evaluating the impact of the utilisation of evidence on the health system, the process of care and health outcomes (Fig. 5).

A systematic review reported by the Centre for Reviews and Dissemination[23] suggests that multiple interventions seem to be more effective than single interventions in evidence utilisation programs, and that implementation is complex. They go on to state that evidence indicates a need for the following steps to be pursued in programs designed to utilise evidence:

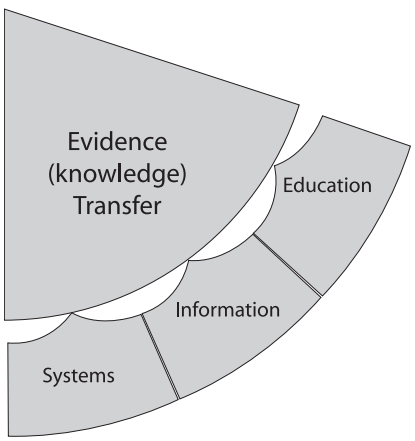


**Figure 4** Evidence (knowledge) transfer.

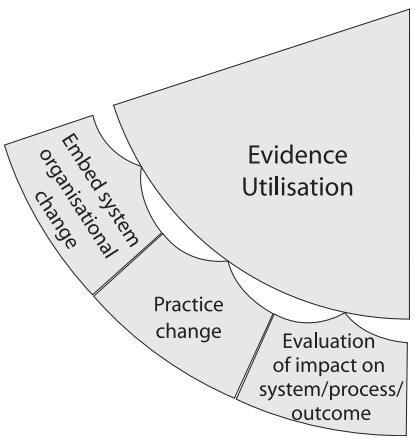


**Figure 5** Evidence utilisation.

- 'A "diagnostic analysis" to identify factors likely to influence the proposed change. Choice of dissemination and implementation interventions should be guided by the "diagnostic analysis" and informed by knowledge of relevant research'.
- 'Multi-faceted interventions targeting different barriers to change are more likely to be effective than single interventions'.
- 'Any systematic approach to changing professional practice should include plans to monitor and evaluate, and to maintain and reinforce any change'.

Of specific strategies found to be moderately effective, audit and feedback appear to be the most promising. Educational outreach (in the form of academic detailing) appears to have some positive effect in the area of prescribing but continuing education and the dissemination of evidence summaries does not appear to impact on implementation. Evidence on the feasibility, appropriateness and meaningfulness of strategies to facilitate knowledge transfer in these professional groups has not been reviewed although work in these areas has occurred through specific implementation projects (see, for example, West *et al.*[24]). Evidence utilisation is highly influenced by factors such as resources, provider education/expertise and patient preference as well as available research.[25] When the evidence suggests the use of a particular intervention and clinicians wish to implement such an intervention, to do so requires organisational planning and decision-making processes. Organisational factors, in addition to individual clinician factors, contribute to these problems; staffing levels and mix, the availability of consultation services and policies are all examples of factors beyond the individual clinician's control.[26] Grimshaw and colleagues,[27] in a review of professional educational and quality assurance interventions, report that multifaceted interventions targeting different barriers to change are more likely to be effective than single interventions. A later systematic review, conducted by Grimshaw and colleagues,[28] concludes that current evidence on the effectiveness of implementation does not address the effects of different contexts or circumstances on guideline dissemination and implementation. They argue that there is a need to develop and validate a coherent theoretical framework of health professional and organisational behaviour and behaviour change to inform better the choice of interventions in research and service settings, and to estimate the efficiency of dissemination and implementation strategies in the presence of different barriers and effect modifiers. Eccles *et al.*[29] concur with the comments of Grimshaw *et al.*,[28] suggesting that there is little useful evidence on effective implementation strategies and arguing for the development and use of theory-based frameworks in evaluating strategies to implement research findings. They suggest that, although a number of reviews of implementation research have consistently shown that the majority of interventions can achieve moderate improvements in care, few studies provide a rationale for their choice of intervention and only limited contextual data.

## Discussion and conclusion

Evidence-based healthcare is gaining acceptance globally. It is complex and sometimes misunderstood and frequently maligned. The JBI model of evidence-based healthcare has been constructed to enable reasoning and critique about evidence-based healthcare and its role in improving global health, within a logical conceptual framework. Drawn from the experience of the Joanna Briggs Institute and its global partners in promoting and facilitating evidence-based healthcare across the world, it is an attempt to conceptually represent the components of a cyclical process that both is responsive to priorities in global health and, in turn, serves to improve global health.

The model posits that evidence-based practice involves giving consideration to the best available evidence; the context in which the care is delivered; client preference; and the professional judgement of the health professional. Promoting and facilitating evidence-based healthcare is depicted as consisting of four major components of the evidence-based healthcare process:

- healthcare evidence generation;
- evidence synthesis;
- evidence (knowledge) transfer; and
- evidence utilisation.

Each of these components are modelled to incorporate three essential elements; and the achievement of improved global health is conceptualised as both the goal and end-point of any or all of the model components and the raison d'être and driver of evidence-based healthcare. Central to the model is a pluralistic approach to what constitutes legitimate evidence; an inclusive approach to evidence appraisal, extraction and synthesis; the importance of effective and appropriate transfer of evidence; and the complexity of evidence utilisation.

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## References


1. Sackett DL, Rosenberg WMC, Gray JAM, Haynes RB, Richardson WS. Evidence based medicine: what it is and what it isn't: it's about integrating individual clinical expertise and the best external evidence. *BMJ* 1996; **312:** 71–2.
2. Sackett DL, Rosenberg WMC. The need for evidence-based medicine. *J R Soc Med* 1995; **88:** 620–4.
3. Stevens K. *ACE Star Model of EBP: The Cycle of Knowledge Transformation.* Academic Centre for Evidence-based Practice. Accessed 1 September 2005. Available from: http://www.acestar.uthscsa.edu
4. Dawes M, Summerskill W, Glasziou P *et al.* Sicily statement on evidence-based practice. *BMC Med Educ* 2005; **5:** 1–7.
5. Titler MG, Everett LQ. Translating research into practice. Considerations for critical care investigators. *Crit Care Nurs Clin North Am* 2001; **13:** 587–604.
6. Stetler CB, Marram G. Evaluating research findings for applicability in practice. *Nurs Outlook* 1976; **24:** 559–63.
7. Stetler CB. Nurses and research: responsibility and involvement. *NITA* 1983; **6:** 207–12.
8. Stetler CB. Research utilization: defining the concept. *Image J Nurs Scholarsh* 1985; **17:** 40–4.
9. Stetler CB. Refinement of the Stetler/Marram model for application of research findings to practice. *Nurs Outlook* 1994; **42:** 15–25.
10. Dobrow MJ, Goel V, Upshur REG. Evidence-based health policy: context and utilisation. *Soc Sci Med* 2004; **58:** 207–17.
11. Humphris D. Types of evidence. In: Harmer S, Collinson G, eds. *Achieving Evidence Based Practice: A Handbook for Practitioners*. London: Ballière-Tindall, 1999; 13–38.
12. Pearsall J, Trumble B. *The Oxford Encyclopedic Dictionary*, 2nd edn. New York: Oxford University Press, 1995.
13. Audi R. *The Cambridge Dictionary of Philosophy*. Cambridge: Cambridge University Press, 1995.
14. Miller S, Fredericks M. The Nature of 'evidence' in qualitative research methods. *Int J Qualitative Methods* 2003; **2**. Accessed 1 September 2005. Available from: http://www.ualberta.ca/~ijqm
15. Pearson A. Balancing the evidence: incorporating the synthesis of qualitative data into systematic reviews. *JBI Rep* 2004; **2:** 45–64.
16. NHS Centre for Reviews and Dissemination. *Undertaking Systematic Reviews of Effectiveness: CRD Report Number 4*, 2nd edn. York: NHS Centre for Reviews and Dissemination; 2001.
17. Light R, Pillemer D. *Summing Up: The Science of Reviewing Research*. Cambridge, MA: Harvard University Press, 1984.
18. Thorne S, Jensen L, Kearney MH, Noblit G, Sandelowski M. Qualitative metasynthesis: reflections on methodological orientation and ideological agenda. *Qual Health Res* 2004; **14:** 1342–65.
19. Noblit G, Hare R. *Meta-ethnography: synthesising qualitative studies*. Newbury Park, CA: Sage, 1988.
20. Glaser B, Strauss A. *The Discovery of Grounded Theory: Strategies for Qualitative Research*. New York: Aldine, 1967.
21. Carande-Kulis VG, Maciosek MV, Briss PA *et al.* Methods for systematic reviews of economic evaluations for the Guide to Community Preventive Services. *Am J Prev Med* 2000; **18 (1** Suppl. 1): 75–91.
22. Pignone M, Saha S, Hoerger T, Lohr K, Teutsch S, Mandelblatt J. Challenges in systematic reviews of economic analyses. *Ann Intern Med* 2005; **142 (**12 (Pt 2) Suppl.): 1073–9.
23. NHS Centre for Reviews and Dissemination. Getting evidence into practice. *Eff Health Care* 1999; **5:** 1–16.
24. West B, Wimpenny P, Duff L, Macduff C, Lyon M, Rae K. *An Educational Initiative to Promote the Use of Clinical Guidelines in Nursing Practice.* Edinburgh: National Board for Nursing, Midwifery and Health Visiting Scotland, 2001.
25. DiCenso A, Cullum N, Ciliska D. Implementation forum. Implementing evidence-based nursing: some misconceptions. *Evid Based Nurs* 1998; **1:** 38–40.
26. Nicklin W, McVeety JE. Canadian nurses' perceptions of patient safety in hospitals. *Can J Nurs Leadersh* 2002; **15:** 11–21 (erratum appears in *Can J Nurs Leadersh* 2002; **15:** 5).
27. Grimshaw JM, Shirran L, Thomas R *et al.* Changing provider behavior: an overview of systematic reviews of interventions. *Med Care* 2001; **39 (8** Suppl. 2): 112–45.
28. Grimshaw JM, Thomas RE, MacLennan G *et al.* Effectiveness and efficiency of guideline dissemination and implementation strategies. *Health Technol Assess* 2004; **8:** 1–72.
29. Eccles M, Grimshaw J, Walker A, Johnston M, Pitts N. Changing the behavior of healthcare professionals: the use of theory in promoting the uptake of research findings. *J Clin Epidemiol* 2005; **58:** 107–12.