

Meaning and measurement: an inclusive model of evidence in health care

Ross E.G. Upshur¹, Elizabeth G. VanDenKerkhof² and Vivek Goel³

¹Assistant Professor and Research Scholar, Director, Primary Care Research Unit, Department of Family and Community Medicine, University of Toronto, Sunnybrook Campus, Sunnybrook and Women's College Health Sciences Centre, Toronto, Ontario, Canada

²Assistant Professor, Department of Anesthesiology, Queen's University, Kingston General Hospital, Kingston, Ontario, Canada

³Associate Professor and Chair, Department of Health Administration, University of Toronto, Toronto, Ontario, Canada

Correspondence

Dr R.E.G. Upshur
Primary Care Research Unit
Department of Family and Community
Medicine
Sunnybrook Campus
Sunnybrook and Women's College
Health Sciences Centre
Room E349B 2075 Bayview Avenue
Toronto
Ontario
Canada M4N 3M5

Keywords: evidence-based health care, medical epistemology, research methods

Accepted for publication:

27 June 2000

Introduction

Evidence-based approaches to health care decision making, originating in clinical medicine, particularly the traditions of general internal medicine and clinical epidemiology, are assuming increasing significance as the concept disseminates through the broader health-care field. The fields in modern health care constitute a diverse set of academic traditions encompassing the humanities, social sciences and pure and applied sciences, as well as a set of heterogeneous professions and trades. Given this heterogeneity, the assumption that a univocal notion of evidence is possible may be problematic.

Evidence-based medicine (EBM) has extended its influence in health care without substantially altering the tenets espoused in its inaugural manifesto

Abstract

Evidence-based approaches are assuming prominence in many health-care fields. The core ideas of evidence-based health care derive from clinical epidemiology and general internal medicine. The concept of evidence has yet to be analysed systematically; what counts as evidence may vary across disciplines. Furthermore, the contribution of the social sciences, particularly qualitative methodology, has received scant attention. This paper outlines a model of evidence that describes four distinct but related types of evidence: qualitative-personal; qualitative-general; quantitative-general and quantitative-personal. The rationale for these distinctions and the implications of these for a theory of evidence are discussed.

(Evidence-based Medicine Working Group 1992). Despite a subtle change in emphasis to digested and summarized forms of evidence rather than independent appraisal by practitioners, the core belief that evidence can be ranked hierarchically with pride of place belonging to systematic reviews and randomized trials remains undisturbed (Levels of Evidence 1999). This approach to evidence recognizes the importance of, but does not elaborate how, context modifies the relevance of evidence. Similarly, although values are regarded as central to health-care decision making, the quantitative orientation to evidence proposed by advocates makes normative discourse seem an afterthought.

The introduction of evidence-based approaches in health care has not gone unchallenged. Critics of EBM argue that EBM represents a narrow reduc-

tionism that ignores clinical judgement and experience and fosters an inappropriate reliance on epidemiology and statistical methodology (Carr-Hill 1995; Miles *et al.* 1997; Charlton 1997). Others argue that evidence-based approaches neglect the true underlying issue that relates to what and how physicians and health care workers know (Tanenbaum 1993; Miettinen 1998). The lack of empirical justification for EBM is regarded as an important and telling fault for an approach based on the primacy of research evidence (Norman 1999). Furthermore, the broad general applicability of the approach in primary care has been questioned (Rosser 1999). In broader socio-political terms the hegemonic tendencies of EBM have been critiqued (Denny 1999). These criticisms raise important questions about fundamental issues in evidence-based care. It has been postulated, polemically, that EBM is dead (Charlton & Miles 1998).

Evidence is indispensable for any health-care profession. Some of the criticisms of EBM relate to its restricted and stipulated definition of evidence. It may not be the death of evidence-based approaches that is required, but rather a more comprehensive and inclusive concept of evidence that recognizes the diverse disciplines and skills in health care and the variety of contexts in which evidence is used.

What is at stake here? If evidence-based practice is to become more fully accepted and integrated into health care then the concept of evidence employed must be robust enough to resonate with practitioners, health-care planners and the wide community of researchers contributing to the discourse. There is already mounting evidence that clinicians eschew evidence-based practice for a variety of reasons (Reid *et al.* 1998; Butler *et al.* 1998; Tomlin *et al.* 1999). Some of this stems from a legitimate concern over what counts as evidence in the first place.

Recent attention to the narrative context of clinical care emphasizes the extent to which context shapes evidence, but more importantly underscores the importance of how evidence is collected and interpreted (Greenhalgh 1999; Greenhalgh & Hurwitz 1999). Qualitative studies from social science researchers have illuminated diverse aspects of medical care in the clinical and policy domains that

fall outside the purview of traditional EBM methods (Hughes & Griffiths 1997; Britten *et al.* 2000). Despite Sackett & Wennberg's (1997) arguments that the research question dictates the study methodology and that battles over the superiority of methods are futile, qualitative methods are either not included in hierarchies of evidence (Levels of Evidence 1999), or are relegated to a lower, less reliable form of evidence (Gray 1997).

Consequently, there is a need for an evidence synthesis that recognizes the interdependence of research methodologies, yet has a sufficient theoretical base that will allow it to have solid 'scientific' standing in the eyes of proponents of evidence-based care. We postulate that it is not the EBM approach that is at fault, rather it is the definition of evidence espoused in that approach. We propose a model of evidence in health care that could provide a firmer basis for evidence-based practice.

The HEALNet evidence project

HEALNet is a Canadian network of researchers from the health, social and applied sciences. It is a member of the Canadian Networks of Centres of Excellence programme which is a partnership among Canadian universities, Industry Canada and the Canadian research granting councils. HEALNet's research mission is to optimize the use of the best evidence in decisions made about workplace health and at all levels within the health-care system. As part of its mandate, HEALNet commissioned a project to investigate the nature and structure of evidence.

The underlying justification of the project is to map the different definitions of evidence and relate these to their underlying epistemological commitments and then link these to clinical applications. An extensive interdisciplinary literature search and synthesis was conducted. Medical, social science and humanities bibliographic databases were searched. Key informants in other disciplines related to health care contacted for key references in law, social sciences and humanities. A 1-day workshop was held to evaluate and modify the resulting model: a taxonomy of evidence.

A model of evidence: meaning and measurement

'Evidence' is an ambiguous term (Miller & Safer 1993). To simplify, evidence is an observation, fact or organized body of information, offered to support or justify inferences or beliefs in the demonstration of some proposition or matter at issue (Goodman & Royall 1988; Sackett *et al.* 1996; Oxford English Dictionary; Oran Legal Dictionary). Reasoning clearly plays a role in its meaning and use and so evidence is offered in the process of deliberation, usually to justify claims. However, reasoning can occur with either quantitative measurements or symbolic forms. EBM arose from clinical epidemiology, a discipline concerned with quantitative measurement. However, the need to incorporate values, preferences and perspectives of individuals and communities means that evidence-based approaches must be equally concerned with meaning.

The concern for measurement stems from the explanatory or Galilean conception of science (Vineis 1997). Newtonian mechanics is a perfect example of this kind of scientific model. It is abstract, employs mathematical language (therefore transcending the particularities of specific, natural languages), general in its application (it applies to all physical objects of a certain size range), universal in scope (that is one can make the calculations from another planet or galaxy) and compels assent from those who understand its logic. Abstraction requires the elimination of particular detail but therefore allows more general or universal application. Predictive capacity and explanatory power are the hallmarks of this vision of science. Quantitative measurement is its usual expression. Precision and accuracy are virtues.

The concern for meaning stems from the contextual or hermeneutic dimensions of evidence. The salient features of this form of evidence are its narrative structure and concern with the interpretation of meaning rather than quantities or properties of objects. Epistemologically it is also rooted in empiricism, but not necessarily quantified reasoning. It is empirical because it relates to the evidence of the senses of the perceiver. If the two concepts of meaning and measurement are given equal weight,

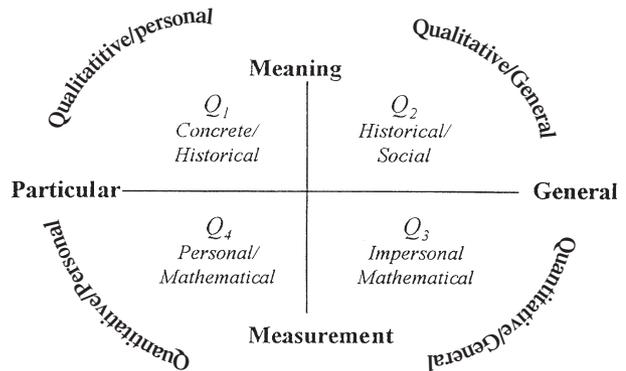


Figure 1 Conceptual basis of the taxonomy of evidence.

then the range of research methodologies can be accommodated in relationship with the context of the application of the methodology.

Figure 1 depicts a model of the four distinct, but related concepts of evidence operative in the health care literature. The horizontal axis sets out the poles of context (particular and personal/general and social) and the vertical axis sets out the poles of method (meaning/measurement). The axes are intended to illustrate the dimensions of evidence rather than establish discrete domains. The vertical axis depicts the range of methodologies used in health-care research. It captures the sense in which methodology is central to how observations are collected, aggregated, analysed and interpreted. The horizontal axis sets out the context of the evidence, which may range from individual care to population health and social policy. Evidence can then be understood, not as hierarchically ordered by methodology as in current evidence-based approaches, but rather as a mediation between the context of its use and method of its production. This avoids ranking strategies that relegate different types of evidence to lesser status.

An essential point to establish in this analysis is that evidence in health care is neither exclusively quantitative and general nor narrative and particular, but is an interaction of both. The model illustrates how there is no single method applicable in all circumstances. It also acknowledges a broader range of research methodologies.

The resulting four concepts of evidence are as follows.

Qualitative/personal

Evidence is primarily narrative in nature, emerges from a historical context and is concerned with particular individuals. It involves the varying beliefs, attitudes, preferences, perceptions and 'epistemological frames' brought forth by both health-care provider and patient. It is illustrated in case histories, clinical encounters and qualitative studies such as in-depth interviews and focus groups. The philosophical and theoretical basis derives from hermeneutics, ethno-methodology, sociology and anthropology.

Qualitative/general

Evidence is primarily social and historical, illustrates social views and preferences and is manifest in policy debates and consensus statements. Here, the managerial perspective emerges as does the set of sciences devoted to the study of health care in its organizational manifestations. The cultural, social and gender dimensions of evidence emerge more prominently in this quadrant. This form of evidence is manifest in policy studies, consensus methods such as delphi groups and case studies. Management theory, political theory and social philosophy contribute to its methods.

Quantitative/general

Evidence is primarily statistical in nature and general in its application. Measurement and rigour are the chief concerns. Quantitative data derived through the application of recognized study designs constitute the basis of evidence. It is impersonal in the sense that the evidence is not to be subject to bias, self- or group interest. The evidence-based tradition is rooted in this quadrant.

Quantitative/personal

Evidence is primarily mathematical and personal. Research exemplars include some elements of clinical epidemiology, quality-of-life scales and cognitive psychology. Evidence is defined in terms of measurement of personal belief. The most clearly stated and developed manifestation of this is found in Bayesian methods of reasoning.

Table 1 summarizes the model and provides illustrative examples of the types of evidence that predominate in each quadrant, the reasoning style and representative disciplines. Thus, the table links the abstract descriptive model to the concrete manifestations and uses of evidence.

Table 1 Relationship of evidence quadrants and evidential features

	<i>Illustrations</i>	<i>Evidence type</i>	<i>Reasoning style</i>	<i>Disciplinary manifestation</i>
Q ₁ Qualitative/personal	Attitudes Perceptions Signs and symptoms	Concrete Particular Historical	Narrative	Nursing Clinical medicine Ethnography Humanities
Q ₂ Qualitative/general	Policies Consensus statements Community and social goals	Historical Social	Narrative	Administration Social sciences Epidemiology
Q ₃ Quantitative/general	Traditional evidence Hierarchy	General Mathematical	Quantitative	Clinical epidemiology Bench sciences Statistics
Q ₄ Quantitative/personal	Bayesian Decision theory Quality of life	Particular Mathematical	Quantitative	Economics Political science Statistics

Conclusions

What are the implications of the evidence synthesis? There are clearly pragmatic implications to this model. The need for explicitness and clarity with respect to evidence claims becomes apparent when the various types of evidence are distinguished. The model serves to integrate the epistemologies found in the various disciplines involved in health care. Most importantly the model serves to legitimize evidence derived from qualitative studies and sets it on an equal footing with other forms of research. This effectively increases the range of admissible evidence in health-care decision making. Finally, the model allows for the incorporation of values in decision making at higher levels (e.g. community). Methods for incorporating such values in evidence-based decision making need to be developed and evaluated. In conclusion, the model expands the scope of evidence, clearly providing a role and place for evidence-based approaches in clinical decision making, but also enabling a more holistic approach to evidence.

The descriptive map of evidence can serve to orientate research projects as well as the development of assessment and intervention tools. Evidence derived from clinical encounters is relevant. The model also clearly emphasizes that approaches from the social sciences and humanities have equal standing as those of clinical epidemiology. In this manner, all forms of discourse, theory and empirical research have standing as evidence in health-care decision making.

Acknowledgements

The authors would like to thank Judith Marshall for her assistance in preparing the manuscript. This project was supported by HEALNet (Health Evidence Application and Linkage Network), a member of the Networks of Centres of Excellence Program which is a unique partnership among Canadian Universities, Industry Canada, and the federal research granting councils. R.E.G. Upshur is supported by a Research Scholar Award from the Department of Family and Community Medicine, University of Toronto, and a New Investigator Award from the Canadian Institutes of Health Research.

References

- Britten N., Stevenson F.A., Barry C.A., Barber N. & Bradley C.P. (2000) Misunderstandings in prescribing decisions in general practice: qualitative study. *British Medical Journal* **320**, 484–488.
- Butler C.C., Rollnick S., Pill R., Maggs-Rapport F. & Stott N. (1998) Understanding the culture of prescribing: qualitative study of general practitioners' and patients' perceptions of antibiotics for sore throats. *British Medical Journal* **317**, 637–642.
- Carr-Hill R. (1995) Welcome? To the brave new world of evidence based medicine. *Social Science and Medicine* **41**, 1467–1468.
- Charlton B.G. (1997) Restoring the balance: evidence-based medicine put in its place. *Journal of Evaluation in Clinical Practice* **3**, 87–98.
- Charlton B.G. & Miles A. (1998) The rise and fall of EBM. *Quarterly Journal of Medicine* **91**, 371–374.
- Denny K. (1999) Evidence-based medicine and medical authority. *Journal of Medical Humanities* **20**, 247–263.
- Evidence-based Medicine Working Group (1992) Evidence-based medicine. A new approach to teaching the practice of medicine. *Journal of the American Medical Association* **268**, 2420–2425.
- Goodman S.N. & Royall R. (1988) Evidence and scientific research. *American Journal of Public Health* **78**, 1568–1574.
- Gray J.A.M. (1997) *Evidence-based Healthcare*. Churchill Livingstone, New York.
- Greenhalgh T. (1999) Narrative based medicine: narrative based medicine in an evidence based world. *British Medical Journal* **318**, 323–325.
- Greenhalgh T. & Hurwitz B. (1999) Narrative based medicine: why study narrative? *British Medical Journal* **318**, 48–50.
- Hughes D. & Griffiths L. (1997) 'Ruling in' and 'ruling out': two approaches to the micro-rationing of health care. *Social Science and Medicine* **44**, 589–599.
- Levels of Evidence and Grades of Recommendations Centre for Evidence-based Medicine, Oxford University. <http://cebmr2.ox.ac.uk/docs/levels.html>.
- Miettinen O.S. (1998) Evidence in medicine: invited commentary. *Canadian Medical Association Journal* **158**, 215–221.
- Miles A., Bentley P., Polychronis A. & Grey J. (1997) Evidence-based medicine: why all the fuss? This is why. *Journal of Evaluation in Clinical Practice* **3**, 83–86.
- Miller S.I. & Safer L.A. (1993) Evidence, ethics and social policy dilemmas. *Education Policy Analysis Archives [Electronic]* **1**(9). Available: <http://olam.edsasu.edu/epaa/v1n9.html> [October 7, 1999].

- Norman G.R. (1999) Examining the assumptions of evidence-based medicine. *Journal of Evaluation in Clinical Practice* **5**, 139–147.
- Oran's Dictionary of the Law (2000) Available: <http://www.rfpwire.com/pathfind/orans/orans.asp> search under evidence [Online] [March 4].
- Oxford Compact English Dictionary (1971) 10th ed. Oxford University Press, Oxford.
- Reid M.C., Lane D.A. & Feinstein A.R. (1998) Academic calculations versus clinical judgments: practicing physicians use of quantitative measures of test accuracy. *American Journal of Medicine* **104**, 374–380.
- Rosser W.W. (1999) Application of evidence from randomized controlled trials to general practice. *Lancet* **353**, 661–664.
- Sackett D.L., Rosenberg W.M., Gray J.A., Haynes R.B. & Richardson W.S. (1996) Evidence based medicine: what it is and what it isn't. *British Medical Journal* **312**, 71–72.
- Sackett D.L. & Wennberg J.E. (1997) Choosing the best research design for each question. *British Medical Journal* **315**, 1636.
- Tanenbaum S.J. (1993) What physicians know. *New England Journal of Medicine* **329**, 1268–1271.
- Tomlin Z., Humphrey C. & Rogers S. (1999) General practitioner's perceptions of effective health care. *British Medical Journal* **318**, 1532–1535.
- Vineis P. (1997) Proof in observational medicine. *Journal of Epidemiology and Community Health* **51**, 9–13.

Copyright of Journal of Evaluation in Clinical Practice is the property of Wiley-Blackwell and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.