

# The role of Informatics to support evidence-based practice and clinician education

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## Abstract

*This paper reports the results of a national event held during November 1998 to educate health professionals representing multiple disciplines about evidence-based practice (EBP), its implementation and the use of informatics to support EBP. A combination of educational delivery methods and multimedia was used. Through local group work, participants identified obstacles to EBP implementation and developed strategies to overcome these in their own local environments. Major and common findings were a lack of management support and infrastructures needed for the successful adoption of evidence-based practices by all.*

## Introduction

Australia's healthcare system has entered a period of rapid computerisation in all areas concerned with clinical healthcare delivery. The Commonwealth government established Health Online during 1999 as a national strategy for information management and the use of online technologies within the health sector. One of its key recommendations is the development of a national framework for the use of electronic health records. Informatics, the discipline combining the computer and information sciences, is increasingly used to provide support tools for evidence based practice, computer assisted decision support and outcomes analysis.

All health care workers require an ability to search for information and new knowledge, and to critically examine factors that impact on people and their environments, such as federal, state and local government health and social policies and health care organisations who manage health service delivery. Australia has a good health care system, but there is considerable evidence that there is scope for improvement in health outcomes (Wilson, Runciman, Gibberd et al 1995; Wilson, Harrison, Gibberd, Hamilton 1999; Lichtig, Knauf & Milholland 1999; Kovner & Gergen 1998; Melberg 1997). Adverse outcomes for some patients are estimated to cost our hospitals in excess of \$800 million dollars per year (Taskforce on Quality in Australian Health Care 1996). An examination of the causes of adverse events resulted in the conclusion that human error is a prominent cause (Wilson et al 1999). Some of the prevention strategies identified by Wilson et al (1999) were better education and training, new or better-implemented policies or protocols and more or better formal quality monitoring or assurance processes. Health care professionals must be prepared to critically explore ways in which they can ensure the provision of quality care that is based on the best evidence available to them.

The notion that every health care intervention is based on valid and reliable research-based evidence is a myth as many interventions lack a solid scientific assessment of effectiveness. However, evidence-based practice is desired by the public, policy makers, educationalists and health care clinicians. The last group is seeking ways to learn about the processes involved to use the results of rigorous research for the benefit of their patients in

everyday practice so as to improve clinical effectiveness. To enhance this activity clinicians are seeking knowledge and skills enabling them to introduce into practice “a conscientious, explicit and judicious use of current best evidence in making decisions about the care for their clients” (Sackett et al 1996). Access to appropriate information systems and knowledge bases at the point of care facilitates this but requires clinicians to have good computer and information literacy skills and to be discerning users of this information and knowledge. Therefore educational changes are needed to prepare the multidisciplinary health care team to effectively use research information on which to base health care decisions. Thus not only by expanding its scientific body of knowledge but also by maintaining its scientific accountability to the public, and to document its contribution to health care delivery whilst providing the bases for sound clinical decision making associated with health care using routinely documented clinical data.

Central Queensland University (CQU) is committed to providing a range of higher educational opportunities that demonstrate its social responsibility and leadership in response to contemporary industry-based issues such as the need to improve the quality of our health services at minimal cost to the Australian community. We at CQU also aim to prepare our students to live and work effectively in the information age. The special educational event reported here served as an example of CQU’s innovative educational approaches by using different types of media to provide access to a diverse range of health professional groups irrespective of location. This initiative came about as a result of our awareness about the poor understanding of EBP principles amongst our postgraduate students who are members of the health workforce.

We are a provider of distance education and frequent users of video-conferencing and the Internet to support our teaching. We decided to use a combination of print-based educational instruction (workbook) supported by didactic presentations and direct interaction with our speakers via multi-point video conferencing and the use of a dedicated web site that included the facility for discussion. Twelve sites participated from Auckland, NZ to Derby, WA spanning 5 time zones. We had appointed a group facilitator at each site to lead group discussions as per instructions provided in the workbook. The duration of this program was four days. This working conference was designed for participants to develop strategies to establish the necessary infrastructure including knowledge, skills, attitudes and technologies required to enable all health professionals to engage in evidence based practice in their organisation.

## **What is evidence-based practice?**

We defined EBP as the practitioners’ ability to process critical evidence that supports their practice/activity to achieve an optimum outcome at minimal cost. Health professionals and the recipients of their care have a shared interest in preventing and alleviating health problems. Our personal clinical experiences suggest that health services are provided with the best of intentions. However, are they effective and were the intended or anticipated results in fact achieved? Information about the effects of health care needs to be systematically collected, reviewed, widely disseminated and used to improve health. With the range of options now available what evidence is used as a basis for making decisions regarding the use of a particular treatment, intervention or care option?

Members of the health professions must wherever possible base their practice on valid and reliable evidence. Participation in the evidence based practice movement could help to achieve this. Furthermore additional strategies for deriving evidence from information or data used in everyday clinical practice are required. Data describing health status and all interventions undertaken should be collected and recorded only once by the clinical care provider at the point of care delivery and be part of their normal work. A byproduct of such rigorous data collection and recording would be the capacity to perform post hoc analyses of these data to determine the effectiveness and efficiency of health services provided in real world settings. Thus evidence about one’s own practice is required as well as evidence representing best practice for any given intervention by any health professional in order to compare outcomes and improve one’s practice. The corollary of deriving evidence is the production of research-based clinical guidelines to enhance practice as these support decision making about appropriate health care for specific clinical circumstances.

## Clinical practice guidelines

Clinical practice guidelines are systematically developed evidence based and valid statements about appropriate health care for specific clinical circumstances to support the decisions made by health professionals in consultation with their patients. They need to be developed by multi-disciplinary groups following the examination of the best available evidence. They need to have some flexibility to suit social circumstances and patient preferences, and be systematically reviewed to assess the appropriateness of specific health care decisions, services and outcomes. They need to reflect 'best practice'. There is evidence demonstrating that the adoption and use of clinical practice guidelines will result not only in improved outcomes but also in substantial cost savings (McCormick and Fleming 1992). The US Agency of Healthcare Policy and Research (now the Agency for Healthcare, Research and Quality <http://www.ahrq.gov>) has developed clinical guidelines for a number of commonly occurring conditions. In Australia such guidelines continue to be developed by the National Health and Medical Research Council (<http://www.health.gov.au/nhmrc>). Many other practice guidelines are developed in-house. Initiatives such as these are supported by the National Expert Advisory Group on Safety and Quality in Australian Health Care. In July 1998, it recommended that "national action continue to be taken to research, develop and encourage implementation of evidence-based practice, including use of clinical practice guidelines and quality improvement tools that reduce unexplained variation and improve aspects of quality across the continuum of care." (p.8)

## Nursing's Contribution

Nurses are primarily concerned with responding to an individual's response to their illness, disease, injury, diagnostic tests and treatments within the context of their available social capital, family and living environment. Nurses do implement doctors' orders but they also assess the potential for any risk of illness, injury or undue stress in individuals and communities. They take steps to prevent these from occurring. Nurses also play a very important role in the education and health promotion of consumers. Thus the nursing profession makes a unique contribution to healthcare and has information needs to support their practice in any setting which are unique to them. Nurses are the largest single group of health professionals involved in contemporary health care. It is widely recognised that a large proportion of any health service provider's budget goes towards paying the wages of nursing staff. Clearly nursing activity is vital to achieving the outcomes health care agencies are aiming to achieve. Despite this, the clinical contribution of nursing to health care is all but formally invisible. The visibility of the nursing profession's involvement in health care is not clearly discernible in our national statistical data collections other than notations regarding the size of the nursing workforce. This needs to change.

Nurses provide around the clock care, are the most numerous and frequent care providers as a group and interact with all other care providers. Nurses are the primary source of information about changes in their patients, they are most likely to identify the early stages of complications and may have to act in the absence of a medical practitioner when timely intervention is required. Thus this staff category has the potential to contribute greatly to the prevention of many adverse events. Indeed Aiken, Smith and Lake (1994) reported lower Medicare mortality among a set of hospitals known for good nursing care. The challenge is to measure what constitutes 'good nursing care'? Evidence based practice will require all health professionals including nurses to have a clear understanding of EBP principles and the supporting technologies which have the ability to transform the way clinical work is done (Jayasuriya 1997). This will also make it feasible to make nursing's contribution to health outcomes more explicit.

One recent example that demonstrates this is the European Union funded, Workflow Information Systems for European nursing CARE (WISECARE) telematics project using oncology as the demonstration domain (<<<http://wisecare.dn.uoa.gr>>>). This project exploited routinely collected nursing clinical and transactional data for clinical and resource management purposes as well as for learning and knowledge sharing purposes from July 1997 to December 1999 from facilities in a number of countries caring for the same types of patients. The goal of WISECARE is to systematically exploit clinical nursing data stored in electronic patient records. This permitted the measurement and comparisons of nursing outcomes. The sharing of this knowledge between nurses improved care and patient outcomes.

## **Educational strategies adopted for CQU's EBP event**

With the financial support of the Commonwealth Department of Health and Family Services (now the Department of Health and Aged Care), Queensland Health, Telstra Conferlink, Therapeutic Guidelines, Health Communications Network, Queensland Rail and Apple Australia, we were able to invite three overseas experts (Dr Kathleen McCormick, Dr Martin Dawes and Ms Jacqueline Droogan) to share their knowledge with our participants. We were professionally supported by the Cochrane Collaborating Centre, the Joanna Briggs Institute for Evidence Based Nursing and Midwifery, the Australian Centre for Effective Healthcare, and the Health Informatics Society of Australia. Additional speakers and on-site facilitators at each of the twelve participating sites were engaged by the program committee that was established to oversee program development.

The program had four themes, one for each day and consisted of four hours of video conferencing and four hours of group work that included web based discussion as desired. The first day provided material to assist individual learning about evidence based practice versus opinion based practice, types of evidence and for participants to explore and appreciate their own foundations of practice. In recognition of the need to change individual work practices in order to adopt EBP, we adopted the appreciative enquiry method developed by David Cooperrider (1987). The workbook contained the instructions for the group work based on this method's 4D Model as its framework, discovery, dream, design and destiny. This model uses consultative and inclusive elements intended to make any organisational change process a positive experience for all concerned. Thus the first day was about discovery to identify and value the best of 'what is' already existing in each participant's working environment. The aim was to build on previous successes.

Each day had specific learning objectives. The didactic presentations, workbook instructions and additional readings provided in the workbook were designed to together facilitate learning. The first day was about when and where to look for evidence. It provided the example of how such evidence may be used by others through the use of clinical guidelines and pathways as well as an overview of organisational, national and international infrastructures needed to support the application of EBP locally. The second day was about dreaming or visioning the future given that increasingly health professionals are being provided with access to the Internet and specialised electronic databases, and the imminent introduction of clinical information systems and electronic health records. This was followed by a SWOT analysis to determine the gap between what is and what we would like to have to facilitate EBP implementation. From here participants entered the design phase and began to examine how their visions could be operationalised. Lectures provided by our experts introduced various tools and techniques that can be used to apply EBP, including information and telecommunication technologies. Questions and discussions with the experts via interactive video conferencing assisted the process. The last day was devoted to the examination and refinement of their action plans to determine the desired destiny.

As part of the sponsorship the Health Communication Network provided all participants with one month of free access to its information sources. This plus the instructions in the workbook is providing participants with a continuing opportunity to learn to use searching tools and more about EBP. Furthermore the Health Informatics Society of Australia has now negotiated with the HCN to include such access as a member service.

## **Video Conferencing and CQU Facilities**

Interactive and multimedia instruction challenges teachers to develop a new facilitative teaching culture, to improve multi media learning materials and to use communication technologies to teach more effectively. It is well suited to adult learning where learners are ready, motivated and capable of self-direction (Knowles 1990). However for videoconferencing to be an effective teaching medium, both the content and educational delivery strategies need to be tailored to suit.

CQU's videoconference facilities include high-resolution large screens and good quality audio enabling truly interactive communication between sites. Some of our teaching spaces are now truly electronic classrooms. This enables the use of a fully integrated document camera, networked computer, other audiovisual teaching aids and microphones with the videoconferencing equipment. Lights and all other equipment are operated via a standard design, touch screen user interface. Similar initiatives have been undertaken by other Universities as well as by the TAFE sector. Many Health care organisations have also begun to install video conferencing

equipment to support telehealth. Consequently a fairly extensive network of videoconferencing facilities exists throughout Australia which in theory at least should support flexible education supported by high quality learning materials using various media combined with interaction between groups of learners and their teachers at places to best suit participants. This symposium set out to test this theory beyond the boundaries of CQU campuses.

## Outcomes

It became evident as the days progressed that people were comfortable with the educational media used. A common theme obtained from the last feedback session was the realisation that a greater use of effective clinical information systems by health professionals, widespread adoption of standards and an efficient telecommunications infrastructure to facilitate electronic data exchange between providers, is essential to the successful implementation of EBP. Participants concluded that the use of information technologies every day would facilitate the recognition of best practices that enhance quality outcomes. They also noted that managers should make EBP a standard part of organisational policy, accreditation and strategic plans so that understanding and support of EBP concepts can be developed from the ground up. As a consequence of this educational event we expect to see more local work based activity towards the implementation of EBP.

Evaluation survey forms were distributed to all participants with a 64% return rate (n=85). Questions were divided into sections about delivery methods and technologies used, whereas the final section assessed the extent of learning that had taken place relative to the symposium objectives. Overall comments were constructive and favourable: 80% were satisfied with the content, 81% reported that their learning was enhanced by the method of presentation and 79% indicated that the video conferencing presentations worked well for them.

Web-based conferencing worked well for 68% of those participants who responded, however not all participants had equal access to a computer and the WWW. Some reported having received some valuable training in the use of this technology. Some difficulties were encountered due to knowledge deficits amongst some of the participants. One person who was not a computer-literate person had been made aware of this technology and is now motivated to learn more about it. Another admitted to a phobia about 'such issues as the Web' but is thinking about learning more about it. Another first time user noted the enormous potential of web based conferencing.

Around 80% found the workbook and readings interesting, appropriate and able to facilitate their learning. Symposium skill based learning objectives were met by between 68% and 86% of respondents.

As many as 86% reported that their knowledge regarding data collection and the generation of information and knowledge had improved as a result of their participation and 88% felt that they learned to appreciate the use and benefits of information technologies. A better understanding of the efficiency and effectiveness of data usage for day to day decision making was reported by 82%. As a result of participating, 88% reported being able to identify existing obstacles to the implementation of EBP, 80% are now able to identify data collection and information processing requirements to support EBP.

A total of 34% indicated they would not attend another conference offered in a similar way. Reasons given were a preference for being at the venue where the presentations are being delivered, insufficient time for interaction, only if technology is of better quality, and provided all presenters adhere to video conferencing procedures and PowerPoint presentations are sent to all sites prior to presentation.

## Comparing conventional educational delivery with videoconferencing

The use of video conferencing essentially represents a shift in who bears various costs. Conventional educational workshops or conferences held in one venue require all presenters and participants to travel to this one site. Not only does this limit people from remote and far away locations to attend due to dollar and time costs, but also from an educational perspective this has limitations. In the event reported here we were particularly keen to reach places like Derby in WA and Mt Isa in Queensland to enable participation of health professionals working in these remote areas. In addition we wished to take advantage of the expertise available in various cities so there

were presentations from five different site locations separated by thousands of kilometers. We also aimed to provide opportunities for local organisationally based multidisciplinary groups to work together to develop action plans for EBP implementation, agree on infrastructure requirements, set priorities as well as the development of a practice performance evaluation strategy. Multipoint video conferencing was well suited to meet these objectives whereas it would have been more difficult to achieve with the use of a conventional approach.

Although participants of video conferencing reduce their time commitment to attend and save in travel and accommodation costs by participating in this type of event, the cost of staging the event, consisting primarily of ISDN charges, is equivalent to hiring the Sydney convention centre. This means that contrary to some participants' expectations, registration fees cannot be any less than what is normally charged for a more conventional conference. From an organisational and conference management perspective the use of multiple sites in fact means the organisation of a number of mini conferences which need to be coordinated simultaneously. This makes it more costly to manage. The use of a number of public hospital based video conferencing facilities did reduce hiring charges. This had the added benefit of ease of access by their staff.

## Lessons learned

Lessons from this experience and useful for others contemplating the use of these technologies indicate that the audience expects near broadcast quality video and good audio at all times. There is also a need for all audio visual aids to be integrated with video conferencing equipment to enhance clarity of delivery. Standards compliance and the use of maximum bandwidth possible to ensure highest possible video and audio quality are essential.

Coordinating times across five time zones was obviously problematic. Maximum connection time at one time should be around two hours with a five-minute break and at least a one-hour break between such sessions. Use should be made of two screens or continuing presence where for example the image of the person presenting is located in the lower corner of each PowerPoint slide projected. Use of a document camera should be limited, and if used, the image should not be moved during transmission.

Each site needs a facilitator who is in charge of all site-related matters. The conference chair has specific duties to engage all sites, communicate the ground rules and ensure all runs on time and in accordance with the plan. Presenters can do much to facilitate interactive communication that results in a group feeling by all participants irrespective of location.

## Conclusion

The symposium's aim was to introduce the principles of evidence-based practice via video conferencing, but its underlying premise was to expose participants to the very technological supports that would enable them to discover for themselves the benefits and shortcomings when seeking evidence to support their clinical practices. The appreciative inquiry approach used during the symposium was to create an interactive approach to local work-based problem solving. We obtained feedback regarding various aspects of the symposium, but there was no immediate identification of how the knowledge gained about EBP would support clinical practice although there were very positive responses to the concepts presented. During the sessions it was apparent that the participants enjoyed the experience of video-conferencing to gain information, and were able to see its usefulness as a very interactive teaching medium when supported by computers to aid communications and identify information sources.

This short course on EBP differed from others in that informatics played a central role. Furthermore it assumed that, as the collection and use of evidence concerns information and knowledge management and retrieval, we should consider the role and use of information and telecommunication technologies to support EBP. This revealed many shortcomings in our national and organisational infrastructures including a lack of support for EBP amongst health service managers.

The deficiencies in the availability of and access to appropriate information systems are being addressed by the Commonwealth, State and Territory Governments. Consequently we can expect that clinicians will increasingly have access to better and more timely information and knowledge at the point of care to assist their clinical



decision making. Clinicians need to prepare themselves now by gaining more knowledge about what these technologies have to offer them so that they can influence standards and system development or system purchases and ensure that such systems will indeed meet their needs. CQU offers a number of suitable courses.

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## References

- Aiken LH, Smith HL & Lake ET 1994, Lower Medicare mortality among a set of hospitals known for good nursing care. *Medical Care Vol 32 No 8*, pp 771-787.
- Cooperrider D, Srivasta S 1987, Appreciation Inquiry in Organisational Life in Woodman, Pasmore (Eds) *Research on Organisational Change and Development Vol.1* JAI Press.
- Jayasuryia R 1997, 'Evaluating health information systems: an assessment of frameworks', *Australian Health Review Vol 20 No 3*, p68.
- Knowles M 1990, '*The Adult Learner, a neglected species*', Gulf Publishing Co, Houston, p 57.
- Kovner C & Gergen PJ 1998, 'Nurse staffing levels and adverse events following surgery in US hospitals', *Image: Journal of Nursing Scholarship Vol 30 No 4*, pp 315-321.
- Lichtig LK, Knauf RA & Milholland DK 1999 'Some Impacts of Nursing on Acute Care Hospital Outcomes', *Journal of Nursing Administration Vol.29 No.2*, pp 25-33.
- McCormick KA & Fleming B 1992, 'Clinical Practice Guidelines', *Health Progress December 1992*, pp 30-34.
- Melberg SE 1997, 'Effects of Changing Skill Mix', *Nursing Management Nov*, pp 47-48.
- National Expert Advisory Group July 1999, '*Implementing Safety and Quality Enhancement in Health Care*', Final Report to Health Ministers on Safety and Quality in Australian Health Care, Canberra ACT, p 8.
- Sackett DL, Rosenberg WMC, Muir Gray JA, Haynes RB, Richardson WS, 1996 'Evidence based medicine: What is and what isn't. It's about integrating individual clinical expertise and the best external evidence', *British Medical Journal 312, 7023*, pp 71-72
- Taskforce on Quality in Australian Health Care Report Appendix 7 Canberra AGPS June 1996 <<http://www.health.gov.au/pubs/hlthcare/toc.htm>>.
- Wilson R, Runciman W, Gibberd R, Harrison B, Newby L & Hamilton J 1995, 'The Quality in Australian Health Care Study', *The Medical Journal of Australia, Vol.163*, pp 458-471.
- Wilson R, Harrison B, Gibberd R, Hamilton J 1999 'An analysis of the causes of adverse events from the Quality in Australian Health Care Study', *The Medical Journal of Australia Vol.170*, pp 411-415.