



ACI NSW Agency
for Clinical
Innovation

Review of Internet Access and Usage in Emergency Departments

Literature Review

A review of the use of Internet resources in
conducting Evidence Based Medicine

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ABSTRACT

Modern medicine is practiced under the principles of evidence based medicine (EBM) that dictates the implementation of the most current and up-to-date evidence into clinical care. Clinicians have cognitive limitations, therefore ready and easy access to resources is critical in practicing EBM. These resources are increasingly and sometimes exclusively found online. Internet technology is relatively new and rapidly evolving therefore systematic research into clinical impact is scarce. Without further study we cannot causally assume improved patient outcomes will result from open Internet access. Internet resources can however contribute to addressing clinician's cognitive gaps, help clinicians deal with information overload, increase the breadth and strength of communities of practice and encourage situational continuing medical education, each contributing to the successful implementation of EBM in emergency care. Since the successful practice of EBM has been shown to improve patient outcomes, the body of evidence presented in this report represents a strong argument for open access to Internet resources to be afforded to all clinicians in an Emergency Department setting.

GLOSSARY

ACI	Agency for Clinical Innovation
CME	Continuing Medical Education
CoP	Communities of Practice
EBM	Evidence Based Medicine
ECI	Emergency Care Institute

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CHAPTER 1

INTRODUCTION

Evidence based medicine (EBM) is considered the accepted standard of clinical practice today. It refers to the “conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients” (Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996). The strength of EBM as a tool for ensuring best practice lies in the integration of clinical experience and context with the most up to date external clinical evidence derived from systematic research that allows care to be tailored according to patient-specific factors (Jenicek, Croskerry et al. 2011). EBM provides consistent provision of safe, effective and individualised care.

Although EBM is now widely accepted as the industry standard, it remains prone to criticism (Wyer 2007). These criticisms are consistently related to the clinical implementation of EBM as opposed to the philosophy of the practice itself. The basic premise of EBM, as is indicated by its name, relies on scientifically tested proof. As long as one ascribes validity to the scientific method used to create this proof, by logical progression, the principles of EBM are sound.

The importance of EBM comes in using evidence to inform clinical practice. This depends upon a robust relationship between clinicians and reliable current evidence sources, a pathway commonly referred to as knowledge translation. Knowledge translation is defined as any activity or process that facilitates the transfer of high-quality evidence from research into effective changes in health policy, clinical practice or products (Lang 2007). Currently health care systems lack adequate mechanisms to support knowledge sharing and best practice (Greiner & Knebel, 2003). The Clinical Research Roundtable at the US Institute of Medicine concluded that “the failure to translate new knowledge into clinical practice and decision-making in health care is a major barrier preventing human benefit from advances in biomedical sciences” (Care 2001).

This report will explore the importance of clinical resources to clinicians in practicing EBM. In particular, it will examine the value of access to Internet resources in

overcoming knowledge translation issues and facilitating the practice of EBM. The report will investigate the utility of traditional and non-traditional internet-based resources for clinicians in striving to uniformly practice EBM in emergency care, and will evaluate the potential positive or negative impacts of open Internet access in Emergency Care departments in NSW.

For the purposes of this paper, Internet technology will be refined to the exclusive discussion of online evidence based resources or technology that facilitates access to such resources. This precludes e-records, clinical decision making aids and clinical ordering systems. The discussion has been refined to information use by clinicians, excluding cited clinician concerns regarding consumers using online health related information. These developments are widely debated in other existing writing.

A literature review of papers exploring the use and availability of internet-based resources for the practice of Evidence Based Medicine, particularly focused on the emergency care setting, was undertaken. Both grey and peer reviewed literature was analysed, with grey literature, in the form of blogs, being particularly important given the focus of the review. Literature acquisition was performed using a combination of Google Scholar, Google and the Australian National University SuperSearch, covering various databases including PubMed.

The terms evidence based medicine, internet and online resources formed the basis of the search, applied using a MESH search term strategy. Snowballing techniques were used from a base of original references and previously established literature reviews. Further searches were also required in pursuit of newer references discussing more recent Internet resource developments. Search terms including web 2.0, knowledge translation and accuracy were sourced from the original reading material and expanded upon. Later search terms included communities of practice, continuing medical education and clinical questions. References concerned with clinical decision making aids, unlike free form online resources, were discarded. Up to date health statistics were sourced from the NSW Health Department online publications and the Clinical Excellence Commission NSW.

CHAPTER 2

RESOURCES ARE CRITICAL TO PRACTICING EBM

Conversely to what many of us would like to believe, clinicians are not infallible (Groopman 2007). It has been estimated that physicians actively use over two million facts in the process of diagnosis exclusively, treatment and prevention notwithstanding (Croskerry 2010). In addition to this already strenuous cognitive demand clinicians are expected to keep abreast of the newest developments in medical research. EBM dictates the active implementation of this knowledge into daily practice (Sackett 1997).

Relying upon a physician's powers of recall to keep abreast of the medical literature is unrealistic. Medical research is growing exponentially. The number of total Medline citations passed 17 million in 2010 and continues to grow (NLM 2010). A review of clinicians reading habits showed that clinicians spend 1- 4.4 hours reading medical literature per week. Of these many report only reading the abstract (Saint 2000). Even the most studious clinician could never hope to keep up with the exploding number of journal articles published each year and certainly not be expected to digest, evaluate and implement the information without external aid (Williamson 1989).

What is more, a clinician's knowledge base has been shown to decrease with time, suggesting both loss of factual recall and an inability to keep on top of new developments in the medical literature. In examination conditions clinician's scores are inversely correlated with years elapsed since medical certification (Ramsey 1991; Choudhry 2005). It is possible that a decrease in knowledge base, demonstrated by standardized test scores, may be offset by an increase in tacit knowledge and clinical experience. However it is generally concluded that a decline in knowledge results in worsening patient outcomes, including lower adherence to widely accepted standards of care (Ayanian 1994; Czaja 1994; Choudhry 2005; Campbell and Croskerry 2007).

Given these cognitive limitations it is unsurprising that clinicians are regularly presented with clinical questions during patient encounters (Smith 1996). Clinicians

underestimate their information needs in general surveys and report only around one question per two to three encounters under immediate questioning (Smith 1996; Davies 2007). However observational study reveals information needs that are still greater. Clinicians fail not only to report cognitive gaps but to identify them in the first place (Osheroff 1991). Due to difficulties in recording clinical questions it is generally accepted that information needs are underestimated in current research.

Cognitive gaps have been identified as one of the major causes of medical error (Blaser 2007). In the six months from 1 January to 30 June 2010, 64,225 notifications of clinical incidents occurring in the NSW health system were made to the Incident Management System of the Clinical Excellence Commission. Of these, 11,171 were related to medications and intravenous fluids and 9,915 to clinical management (Clinical Excellence Commission 2010). These statistics unnervingly mirror the content of clinical questions where studies of clinical information needs consistently show information seeking about drugs and treatment strategies (Smith 1996).

Fortunately, however, these errors are not innate. Most clinical questions posed by clinicians go unanswered (Gosling 2003). However, a systematic review of clinical information retrieval technology suggests that approximately one third of information retrieval efforts by physicians influence their decision making (Pluye 2005). Similarly information-seeking episodes, studied through a web log analysis of search terms, have been correlated with discharge diagnosis. Therefore providing answers to these clinical questions through fast access to reliable resources may contribute to decreasing the rate of harmful incidents occurring in NSW hospitals (Ellis 1995). The decision to pursue answers to clinical questions is influenced by perceptions of urgency but more persistently by issues of knowledge translation (Gosling 2003). As there is consistent demand for increasing quality of care in NSW hospitals, factors that influence successful information seeking episodes should be addressed.

Resource access in EDs is particularly important

The clinical environment of an emergency department encompasses a wide range of clinical presentations. Emergency medicine is a broad horizontal specialty which is influenced by developments in most aspects of medicine (Lang 2007). Generalist clinicians in primary care have a weaker knowledge base than specialists and therefore have greater point-of-care information needs (McKibbin 2006). The nature of emergency care imposes time constraints and high pressure upon information needs (Graber 2008). Emergency physicians do not have the luxury of follow-up visits or an established familiarity of a patient's medical history (Graber 2008).

This is reflected in the patterns of question posed by emergency care clinicians. One study conducted by Graber et al. (2008) revealed that ED clinicians report a lower number of clinical questions and those that are posed are more actively followed up while the patient remains in the clinic. ED clinicians answered 80-89% of clinical questions posed in an ED setting, which is significantly higher than studies in family care or other specialties. This may relate to the critical and time-poor nature of emergency medicine whereby in order to justify time spent on information seeking the question must be considered directly relevant to patient care.

The high cognitive load and decision density associated with overcrowded and under resourced EDs leaves them particularly susceptible to information gaps and subsequent errors (Croskerry and Sinclair 2001; Campbell, Croskerry et al. 2007). ED physicians are therefore highly likely to benefit from increased access to critical resources.

These resources are increasingly available online

The resources necessary to answer these clinical questions are increasingly and sometimes exclusively available online. There has been in medicine, as in almost every aspect of modern life, a definitive trend of information migration from print to the web.

Information technology is increasing access and usability of traditional resources. Traditional resources can be defined as online resources that are simultaneously

available in traditional print form for example online journals, textbooks, reports and publications. The migration of these resources to the Internet reflects only a change in medium, print to online, rather than a fundamental shift in the nature of the information itself. Online libraries and electronic search capabilities put gigabytes of information at a researcher's fingertips (Jadad 2000). Most medical journals are now available online, with some exclusively so. De Groote et al. (De Groote 2003) conducted a survey of resource use and found that 71% of respondents indicated a preference for online over print journals when possible (De Groote 2003.) Similarly, textbooks are now regularly accompanied by an e-text, or online resource, to complement the printed content. It is now the expected norm for organisations to maintain an online presence, usually in the form of a website or social media page.

Online resources have been accepted as valuable clinical support

The value of these traditional types of online resources in informing clinical practice has been widely reviewed, with interest peaking around 2005. Pluye et al. conducted a literature review of the impact of online resources in a clinical setting documented up to 2004 (Pluye 2005). They found that nearly one third of information searches using information technology had a positive impact on physicians. Positive impact was defined as changing clinical practice, encouraging learning and recall or providing reassurance or confirmation for decisions. They concluded that their results encourage continued research and proactive uptake of online resources in medicine.

A general consensus has been reached in embracing traditional online resources. As early as 1997, the NSW Department of Health launched the clinical information access program (CIAP), a clinical database of preapproved resources including drug databases, Medline and online journal subscriptions. The provision of this resource to all NSW health system employees is a good indication of acceptance that "providing clinicians with easy access to evidence will support decision making and result in improvements in patient care" (Westbrook 2004).

However pitfalls of online resources are also prevalent in the literature. Pluye et al. also revealed cases of negative impact or no impact, which was defined as causing

frustration or dissatisfaction and discourage searching in clinicians. It is extremely important to note that although the review recognised it as a possibility, *no cases of wrong or misused online resources resulting in harm to a patient were identified.*

Negative impact consistently referred to difficulty in locating the relevant information, including difficulty in formulating search strategies, too much information, difficulties in filtering information, difficulties in translating information into a clinically relevant form as well as speed, access and ease of use issues (Casebeer 2002; Ely 2002). Online databases can answer the majority of clinical questions given adequate time, money and search skills and therefore issues with traditional online resources are often related to their effective use rather than the overall content (Gorman 1994; Hersh 2002).

2.4 Information technology is promoting a diversification of resources and tools

Not only are traditional information sources increasingly available online but simultaneously an abundance of non-traditional resources or tools are being developed online. In comparison to more traditional and static web resources, these non-traditional resources are defined by their collaborative and dynamic nature. These tools consist of open source “transparent technology” where software is contained within the Internet programs and is designed for use by persons of low-til technical skill. These user centric, participative resources have been recognized as a new era in internet technology and fittingly coined web 2.0 (O’Reilly 2005).

Web 2.0 offers new and exciting information resources that are transforming how we approach information. In this manner Web 2.0 is poised to address some of the most pervasive issues in knowledge translation including information access, overload, retention and implementation in emergency care (Dinh 2011).

CHAPTER 3

ARE WEB 2.0 RESOURCES USEFUL IN THE ED?

Limited studies of Web 2.0 resources have been conducted in the clinical sphere. These are relatively new resources and research is subject to a traditional lag. However many exciting prospects of Web 2.0 have been discussed by forward thinking clinicians and information specialists. The emergency medicine specialty is leading the way in adapting and applying them to clinical medicine and biomedical research (Cadogan 2009).

One of the most recognizable Web 2.0 resources is the Internet search engine (ISE) Google. Google is considered a Web 2.0 resource because its search strategy - called PageRank - indexes retrieved information according to a combination of relevance and popularity. In studies of clinical information seeking Google regularly appears as the go-to resource. It is markedly more popular for conducting searches than PubMed UpToDate or Medline (Steinbrook 2006; Graber 2008). A novel study conducted by Tang and Ng (Tang 2006) looked at the capacity of Google as an effective diagnostic aid. The study authors searched Google with terms from case records and determined whether the correct diagnosis was prominent in the first three to five pages of results. In 15 of 26 cases Google gave the correct diagnosis, with more difficult diagnostic cases the most likely to be helped by "Googling".

The study by Tang et al. stoked paranoia that misuse of unreliable information could cause medical errors. A subsequent study by Krause et al. found that converse to Tang and Ng's results, the ability of Google searches to correctly answer clinical questions was poor (Krause 2011). This study asked a broader range of clinical questions than those specific related to diagnosis in the previous study and was therefore more likely to reflect information seeking behaviour in the ED. Although Google searches did increase correct answers in comparison to a pre-test, it also increased incorrect answers and resulted in a decrease in uncertainty regarding incorrect answers. This is worrying and reflects

an automation bias to trusting online results and a failure of clinicians to assess reliability or sources (Krause 2011). However the study was conducted in a laboratory setting, detached from normal ED conditions where the gravity of decisions would usually place uncertain answers under closer scrutiny and the review of fellow colleagues.

Although these results seem discouraging it is important to remember that other more traditional resources also report high levels of incorrect information and no infallible resources exist. A pertinent example is information seeking from colleagues. Colleagues represent the most regularly consulted source of medical information by clinicians. However research has shown that when no evidence is supplied to support anecdotal advice given by colleagues then these responses are highly likely to be flawed, wrong or inconclusive (Martinez-Silveira 2008). It is pertinent to note that in the study by Tang et al. it was noted that the successful Google search was reliable on an "expert" searcher, or a searcher with a clinical knowledge base to formulate the search terms. The "expert" is critical to knowledge translation as the final filter for information.

Speed and Ease of Access

Although the usefulness of Google for answering clinical questions is inconclusive and requires further investigation, there are other reasons Google is a strong asset in the ED. Google is the preferred ISE due to its smooth interface and intuitive nature. Additionally clinicians are familiar with Google in their daily lives. In February 2008, an estimated 5.9 billion searches originated on Google. This represented 59.2% of all searches (Watch 2008). Familiarity may explain why, despite questionable reliability and the availability of other more medically specific resources, Google use

persists in clinical information seeking. Furthermore another critical aspect of information seeking is access speed. The average physician will spend only two minutes looking for an answer before giving up the quest, this time is likely to be even shorter in the ED (Alper 2005). Google is fast and efficient because users are accustomed to it and can use it to bypass the need for web addresses in order to easily find or return to good quality resources.

On the other hand, Google remains subject to similar knowledge translation issues faced by resources like CIAP (Westbrook 2004; Tang 2006). Google searches produce endless pages of results, have little power to distinguish accuracy of resources and may provide access to content that is too lengthy and difficult to digest.

Separating the wheat from the chaff

It has been argued that the issue clinicians face is not content overload but failure to employ filters to sort and rank information (Addison 2012). It is here that Web 2.0 resources are proving powerful tools in addressing the knowledge translation issues faced by clinicians. Web 2.0 tools work in such a manner as to aid information seekers in navigating the overwhelming volumes of information on the Internet.

Collaborative Web 2.0 tools act to “filter” information in a process termed apomediation (Eysenbach 2008) Previously intermediaries such as librarians or journal editors acted as “gatekeepers” to quality evidence. Apomediation relies rather on “collective intelligence” or wisdom of the crowds to identify credible information and services. This is web democracy at work; the most useful and engaging resources will gain more hits, retain these hits and grow from them through tags, links and a higher search ranking. This method of crowd-sourcing knowledge management ensures the most interesting, relevant and reliable information rises to the top.

Creating and modifying content

Web 2.0 resources are addressing information overload by allowing the creation and modification of content by users (Savel 2007). Blogs, Wikis and pod/vodcasts are three prominent examples of Web 2.0 tools that allow users to create or curate content without programming knowledge. “Collaborative intelligence” reduces the workload for an information seeking clinician and provides information in a form that is value-add. Value-resources have already been “digested” and filtered through a participative system, this may be in the form of a link to new research that has been identified as important or a summary or discussion of this new research that is created by the user. This collaborative intelligence is particularly powerful when used community of experts, like the medical field, whose specific knowledge can combine with and complement that of their peers via interactions such as commenting and editing (Boulos 2006). Growing faith in the power of Web 2.0 tools can be shown for example by the recent announcement by the World Health Organisation that its International Classification of Diseases will be opened up for revision via Wiki.

CHAPTER 4

RELIABILITY VS. USABILITY

Concerns are often raised about the reliability and accuracy of this “user-created” content. The top tier of research in EBM is considered to be critically-appraised individual articles, topics and systematic reviews, followed by randomized clinical trials, cohort studies and case-control studies, case series and reports. The lowest form of evidence is background information and expert opinion (Haynes 1990). Many Web 2.0 resources created and edited by clinicians can be, at best, considered expert opinion or more likely “unreliable”. In a study conducted by Chisolm et al. reviewing the log files of an emergency department workstation in Wishard, US they found of the top ten websites used by staff only one could be considered a top tier resource, three second tier, one expert opinion site and four sites that could be considered unreliable including Google and Wikipedia (Chisolm 2012).

Although the use of the best quality clinical evidence is desirable it must be recognized that a trade-off exists between information quality and ease of practitioner access and use. Evidence must be filtering down to the clinical frontline for any positive impacts on care to result (Wyer 2007). Given the serious knowledge translation issues faced by time-poor and patient overloaded Emergency clinicians resources to be useful must be easy and simple to access and understand. Obviously, a strong emphasis through education, training and institutional culture should remain on reliability and accuracy considering the potential harmful impact of unreliable resources (Hughes 2008).

Of course user-created Web 2.0 resources can never be considered top tier resources because they lack authoritative filtering of their content. However they are making significant progress in increasing reliability and accuracy of online content. Apomediation is a strong tool for increasing content quality. A study comparing Encyclopedia Britannica and Wikipedia showed that they have (Giles 2005) remarkably similar accuracy rates, although both exhibited disappointingly high numbers of errors. High internet traffic and ability to interact with resources by commenting or editing means that wrong or misleading information is quickly picked up by users and edited or taken down (Esquivel 2006). Additionally codes of practice have been developed to address issues of patients right to privacy and of copyright including the Health Care Bloggers Code of Ethics (<http://medblogcode.webs.com>) (Ethics 2008) and the Health on the Net Foundation (<http://www.hon.ch>) that regulates the use of clinical pictures, patient details and other sensitive content.

The most powerful part of Web 2.0 is that they get better with use. As more clinicians and health organisations begin to exploit these resources their value and reliability will only grow.

“The more we use, share, and exchange information on the web in a continual loop of analysis and refinement, the more open and creative the platform becomes; hence, the more useful it is in our work.” (Giustini 2006)

CHAPTER 5

CREATING COMMUNITIES OF PRACTICE

Emergency Medicine is a sector renowned for its enthusiasm for knowledge pursuit. Engaged clinicians readily form information sharing and discussion networks. Interpersonal communications among practitioners is one of the primary mechanisms for information flow in health care. Barriers to this kind of interaction in EDs have been identified including the busy, high-pressure work environment, shift work, constant interruptions and complexity of patient care. Further boundaries are geographical. A study of rural and regional clinicians in Australia conducted in 2006 showed that more than three quarters of clinicians felt a degree of professional isolation. A lack of interaction

practice also represent a way to record and share clinical experience and tacit knowledge by discussing and responding to specific clinical contexts and seeking advice from peers. Virtual CoPs are particularly powerful as they provide a platform for sharing and discussion of multi-media clinical elements, including videos, photos and audio (Pan 2003; Curran 2009). Web 2.0 tools allows savvy users to create a “massive collaborative reading pool” although training and logistical support are important to encourage institutional uptake by all (Falkman 2008). These difficulties are however likely to decrease with the entrance of increasing internet-literate graduates into the workforce.

“A powerful education and communication strategy. [A place to] share questions, create groups, upload resources, have meaningful conversations.” (Cadogan, 2013)

with professional peers was cited as the primary cause of isolation. Information technology can help overcome these barriers. Web 2.0 tools act to expand and deepen these networks and bridge geographical boundaries in an asynchronous manner allowing for increased participation particularly for isolated rural and regional clinicians (Curran 2009).

A community of practice (CoP) refers to a group of people who share a common interest. A concept originating from social learning theory it describes the practice of sharing resources through interaction. These resources are made more valuable by the social aspect of sharing, increasing motivation and engagement. It has been shown that a culturally and socially enriching environment, with peers committed to achieving the same goals will encourage and regulate each others performance (Bruner 1990). Virtual communities of

Mike Cadogan, an ED specialist and author of medical blog Life In the Fast Lane sees the concept of social media as facilitating CoP creation; “A powerful education and communication strategy. [A place to] share questions, create groups, upload resources, have meaningful conversations.” (2013)

CHAPTER 6

THE POWER OF SITUATIONAL LEARNING

Using Web 2.0 resources through open Internet access also strengthen CoP's within ED and contribute to knowledge acquisition and retention. The medical accreditation system relies on knowledge to be passed through the ranks from senior clinicians to training doctors including interns and registrars. Nurses similarly exhibit a knowledge hierarchy. What is more, all clinicians are expected to carry out constant continuing medical education (CME). The ED is therefore an important teaching and learning environment.

As it has been established medical professionals cannot be expected to keep up to date with medical progress by traditional methods. Traditional methods of CME have also been shown to be ineffectual and often irrelevant to clinical context. Lectures and readings, for example, show retention rates of around 10% and fail to influence standards of clinical care.

By contrast learning opportunities are abundant in a daily working practice, and the impact of these knowledge seeking and learning episodes can be significant. A study of CIAP use showed that server peak times occurred during working hours suggesting searching was prompted by clinical questions (Westbrook 2004). "Pull" information, or information sought for a specific reason and then applied is more readily retained. This type of situation learning or learning that is reinforced by practice exhibits 60% greater long term retention in comparison to didactic knowledge (Martensen 1985).

In situational learning opportunities, though abundant in the ED are restricted by time constraints and the unpredictability of patient presentations as well as access to resources. Rapid and easy internet access ensures that when interesting cases present in the ED clinicians can pursue clinical questions and share these relevant resources with their colleagues. Tech-savvy staff can also demonstrate how to locate and use good quality resources which is part of the curriculum in practicing EBM. Teaching, sharing and creating content are some of the most powerful learning methods and contribute to creating a culture of information, an increasing knowledge base, and critical evaluation of resource of the entire CoP (Kabrhel 2005).

CHAPTER 7

INSTITUTIONAL PREROGATIVE

Repeated studies of information resource use in a clinical setting find that uptake is increased by the presence of “champions” who promote and lead by example in adapting and exploiting new technology or systems (Howell 1990; Ash 2003). This idea of champions can be more broadly applied to institutional attitudes (Massaro 1989). A forward thinking and open policy to internet access and resource use will filter through the ranks and encourage staff to emulate this progressive attitude to new policies, practices and guidelines.

Clinical risk management increasingly assesses medical errors broadly in terms of institutional and systematic failures, rather than the failures of an individual (Vincent 1998). Liability to error is strongly affected by adverse conditions of work (Vincent 2000). Restricted access to resources is identified as one of the key management-mediated contributors to medical error (Brent 2001). As early as 1990 concerns were raised about the legal implications that the increasing abundance of medical information available to clinicians and, importantly, consumers, may have (Kirby 1995; Wyer 2007).

There are abundant examples of other clinics doing the same prompting the recent opening of The Mayo Clinic Centre for Social Media to support these organisations in their first steps into the World Wide Web. The National Health System in Britain also has a more progressive attitude towards Internet use. A quote from an NHS employee states that Health management at his Trust of employment;

“Did not think it was progressive to block access to staff... There are no more filters and the Internet is pretty much free to access.” (NHS Employee, 2013)

“If the law were to judge a doctor negligent for failing to institute recognised best practice, the continuation of an informed patient population and an overworked clinical community provides a recipe for increasing litigation” (Coiera 1996).

To this end, the onus is with management to ensure that the clinical environment not only allows, but actively encourages, the use of quality resources to inform EBM. It can be considered an institutional failure, detrimental to clinicians and patients alike, not to provide and actively encourage the greatest possible synthesis of medical resources with clinical practice.

It is pertinent to note that there are examples of foreign health sectors with open Internet access policies. The Mayo Health clinic in the US currently holds a Twitter and a Facebook account and has its own YouTube channel.

CHAPTER 8

CONCLUSION: JOINING IN THE CONVERSATION

In the 1990s when Evidence Based Medicine (EBM) was in its infancy one of its founders and greatest advocates, David Sackett, conceived the idea of the Evidence Cart (Sackett 1998). Sackett understood that successful EBM depended upon a robust relationship between clinicians and current evidence sources. He envisioned a type of portable library that ensured critical evidence was readily available where it was needed the most, at the bedside. Today, with wireless and broadband technology we can see the potential of internet resources to fulfil Sackett's vision (Bullard 2004).

Web 2.0 is relatively new and rapidly evolving. Comment and hype are abundant however systematic research in this area is scarce. Without further study we cannot causally assume improved patient outcomes will result from an uptake of Web 2.0 tools. This report has only scrapped the surface of the plethora of Internet tools and possibilities they represent. This report has also failed to address some of the risks associated with open internet access, however these issues including electronic security and funding are related to the logistics of internet provision and less so the impact on clinical outcomes.

However it is widely accepted that the successful practice of EBM leads to improved patient outcomes. EBM demands a clinical environment that is resource-rich, and innovative. This report has demonstrated that open access to internet resources, especially the new generation of Web 2.0 tools can contribute to creating this resource-rich environment by helping clinicians deal with information overload, increasing the breadth and strength of CoPs, and encouraging situational CME.

It is necessary to acknowledge the potential risks associated with unreliable online content. The apomediation process and the provision of education and training in critical resource evaluation combined with the oversight of institutional management address the issue to a certain extent (McKibbon 2006; McLean 2007). Additionally, the knowledge that foreign health

sectors have already openly embraced the Internet and the lack of explicit examples of harm resulting from misuse of online evidence in the literature further minimise the legitimacy of these concerns (Pluye 2005). Given that the opposing situation of limited resource access has been definitively linked to poor patient outcomes and exposure to liability and that the Internet is becoming the major platform for publication and discussion of new medical research, this report represents a strong argument for open access to Internet resources to be afforded to all clinicians in an ED setting.

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