



NATIONAL INSTITUTE OF CLINICAL STUDIES

Electronic Decision Support
Systems Action Planning Report

November 2004

TURNING EVIDENCE INTO ACTION

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EXECUTIVE SUMMARY

This document is a report on investigations into the uptake of Electronic Decision Support Systems (EDSS) by Australian clinicians. It provides details of the current literature in the area of EDSS uptake around the world, lessons learned and problems encountered. It provides an update to the National Electronic Decision Support Taskforce report, *Electronic Decision Support for Australia's Health Sector* (November, 2002). The report concludes with a suggested set of actions that the National Institute of Clinical Studies (NICS) may wish to consider in improving the uptake of EDSS in the Australian health sector.

The investigation involved revisiting the EDSS Taskforce report to extract the stated barriers to successful uptake of EDSS. Using the evaluation results of the NSW CIAP as a case study these barriers were tested empirically to see whether they were identified as significant barriers by clinicians themselves.

The investigation also involved searching the available literature for reports on barriers and/or success in implementation of EDSS in a clinical environment, dated after 2002, the date of the Taskforce Report. This literature search provides an update in the international arena on this topic.

Finally, the opinion of several prominent Australian researchers in this field was sought as to what the course of action should be.

Conclusions

The investigation found that:-

- despite major efforts, the Taskforce Report list of barriers is still current and awaits resolution to improve the uptake of EDSS in Australia;
- the literature had very little new to add to barriers to uptake but there was plenty of corroborating evidence about known barriers;
- the literature indicated that international activity in this area is prominent and increasing effort is being made to address barriers to uptake. Australia, through trials like CIAP, has considerable knowledge to contribute in this area;
- the lessons learned by all projects implementing EDSS in a clinical environment, and echoed by the CIAP trial in NSW, is that the problems will not be solved by the application of more technology. There is plenty of technology available to significantly improve health care outcomes. The problems being met are organizational and human factor related and their resolution requires organisational and human factor focussed responses;
- training in this area in Australia seems uncoordinated and almost totally lacking. There are localised and isolated training courses provided but there is no significant effort by existing medical training institutions to formally incorporate EDSS training in their training schedules;
- there needs to be a coordinated Government response to the implementation and roll-out of EDSS in Australia. The current situation of each State rolling out almost identical EDSS environments, duplicating costs, is a shameful waste of taxpayers' money. Coordination will result in significant saving across the board and should provide considerable improvements to health outcomes;
- there needs to be a significant effort in Australia to develop authoritative knowledge sources for inclusion into EDSS services. Some comments were made that an Australian entity to approve knowledge bases is needed to avoid replication and improve the standard of available knowledge bases;

Suggested Actions for the National Institute of Clinical Studies

The following is a list of actions that National Institute of Clinical Studies may consider to improve the uptake of EDSS in a clinical environment.

The actions are not directed at any specific sub-sector of the health sector but it is recognised that National Institute of Clinical Studies may wish to stage a roll-out from a limited targeted sub-group to the whole sector over time. The advantage of this strategy is that the activity can be honed to maximise the impact of the service. Benefits of any activity will be seen sector wide given the appropriate exposure.

Short-Term

Short-term recommendations are generally education based.

Basic primer

The development of a 'dummies' guide to the Internet for clinicians to guide them into the basics of Internet usage. This primer need not be built from scratch but would require the identification of a best-of-breed of primers already available but localised for health/clinician use. The primer would be available from National Institute of Clinical Studies, through their web site, on CD/DVD and as a paper resource.

This primer would provide assistance to the novice clinician in terms of identifying high quality information sources on the Internet and basic descriptions of search engines, how they work and how they can be made to work for them.

This might complement HealthInsite, who are beginning to provide aspects of such material.

Advanced Primer in the Use of Decision Support Tools

The advanced primer provides assistance to clinicians in finding evidence online, assess the quality of online evidence, and make decision based upon what they find. The primer would explain how clinicians are likely to make mistakes and provides more details of search engine technologies and how to find suitable evidence.

This primer also advises how to be a safe and effective user of evidence tools online and a safe and effective user of decision support systems. This primer could be used as an aid in a more formal training session.

The development of this primer would assist in the translation of the extensive literature on clinician decision biases and errors into a tool of real value to clinicians at the coalface.

EDSS evaluation portal

This recommendation is for the development of a web-based information service, or portal, where clinicians can access simple guidance on how to evaluate a decision support system and where they can place results of their own evaluations and experiences in the use of decision support systems. This is an extension of the EDSS Guidelines project being delivered to DoHA, containing a first attempt at simple guidelines for the evaluation of EDSS.

This portal also disseminated knowledge of working out whether something works or not and then disseminating that evidence. In this way, it can be seen as core to the National Institute of Clinical Studies.

This information clearinghouse, or community of practice, would be the place for up-to-the-date information about EDSS and their use in clinical environments and would represent an important resource for the Australian health sector.

An important component of this clearinghouse would be a service wherein people can communicate with others and share their questions and understandings in a real-time environment. This could be cheaply implemented using existing chat-room or information-list software technology.

The seeds of this service would be in the guidelines being created for DoHA

This recommendation is short term because National Institute of Clinical Studies will get significant benefit in the short term even though this is an on-going activity well into the medium term.

Medium-Term

Evidence based medicine services (portal) involving QuickClinical technologies

Building on top of the evaluation portal, this recommendation is for the provision of value-added information services to existing search engines. Currently, users will search individual search engines, one at a time, to find available evidence. This recommendation is for a meta-search engine to sit between the user and the existing search engines and apply intelligent searching to answer real questions.

Implementing this recommendation would lead to the integration of existing information services, such as the Cochrane database, BMJ Clinical Evidence, into a single information service by enabling the intelligent search across such approved services by the National Institute of Clinical Studies' Meta-Search Engine.

Any such service would have to be localised to clinician groups, such as anaesthetists, surgeons, etc, who all have disparate information needs.

This recommendation anticipates a similar move in the commercial publishing world to the provision of integrated services rather than discrete information systems.

Consumer information needs

This recommendation is for the establishment of a research program into the information needs of consumers.

There is a large body of knowledge about the information needs of clinicians and health professionals, but almost none with respect to consumers.

Yet consumers are going on-line to find answers. This recommendation would provide valuable knowledge about their information needs so that appropriate information services can be established to improve consumer knowledge and awareness.

The research would also investigate the optimum mechanism for reaching consumers. This may involve digital television, digital radio, the Internet and conventional publishing channels.

Long-Term

There are no long-term recommendations beyond the advice of monitor the situation and ensure that National Institute of Clinical Studies' vision and strategic direction remains topical.

This research project has indicated that we are on a journey. However, we are at such an early stage in the journey that it is difficult to predict where the journey will go in the longer term.

TERMS OF REFERENCE

This report is to provide recommendations to the National Institute of Clinical Studies (NICS) on actions NICS can take in assisting the removal of barriers to the uptake of Electronic Decision Support Systems (EDSS) in a clinical setting.

The study is also to provide indications as to current activities in Australia related to the training of health professionals in the use of EDSS.

The report was commissioned to guide the development of an action plan for NICS to address the uptake of EDSS.

DEFINITION OF ELECTRONIC DECISION SUPPORT

There are many definitions of electronic decision support systems.

The Taskforce Report (NEDST, 2003) defines it as a system accessing knowledge stored electronically to aid patients, carers and service providers in making decisions on health care.

A General Practice Electronic Decision Support Workshop (1999) defined it as a system that compares patient characteristics with a credible knowledge base and then guides a clinician by offering patient specific and situation - specific advice. By incorporating evidence-based guidelines and a summary of the patient data or knowledge base, the clinical decision making process is enhanced, thereby potentially improving the quality of care.

Wyatt & Spiegelhalter (1991) provides, clinical decision support systems are: "active knowledge systems which use two or more items of patient data to generate case-specific advice".

The OpenClinical web site (<http://www.openclinical.org/dss.html>) states, Clinical DSSs are typically designed to integrate a medical knowledge base, patient data and an inference engine to generate case specific advice.

The Taskforce Report (NEDST, 2003) defines it as a system accessing knowledge stored electronically to aid patients, carers and service providers in making decisions on health care. It has adopted a four-level classification system, as follows:

- Type 1 - provides categorised information that requires further processing and analysis by users before a decision can be made;
- Type 2 – presents the clinician with trends of patients' changing clinical status and alerts clinicians to out-of-range assessment results and intervention strategies. Clinicians are prompted to review information related to alerts before arriving at a clinical decision;
- Type 3 – uses deductive inference engines to operate on a specific knowledge base and automatically generates diagnostic or intervention recommendations based on changing patient clinical condition, with the knowledge and inference engines stored in the knowledge base; and
- Type 4 – uses more complex knowledge management and inference models such as case management reasoning, neural networks, or statistical determination analysis to perform outcome or prognostic predictions. Such systems possess self-learning capabilities and use fuzzy set formalism and similarity measures or confidence level computation as mechanisms to deal intelligently and accurately with uncertainty.

In this report, we have followed the Taskforce Report definition but recognise that the other definitions must be taken into account when searching for literature about EDSS.

THE CLINICAL INFORMATION ACCESS PROGRAM (CIAP) STUDY

This exploration of barriers to uptake uses the CIAP study to compare barriers as found in the literature with actual barriers as reported by participants in the CIAP study. The CIAP study was chosen as a case study for this investigation because it represents the largest study undertaken in Australia in this area and the researchers who undertook the study were colleagues at the Centre for Health Informatics and thus all research data was still available if needed.

The CIAP study was a two-year evaluation of the CIAP undertaken by the Centre for Health Informatics at the University of New South Wales. The aim of the study was to improve understanding of the clinicians' information needs and assess the extent to which CIAP supports clinical decision-making processes and any improvements to patient care.

The study involved 55,000 clinicians across NSW who had access to the CIAP system. The clinicians spanned across the health sector, including specialists, doctors in city and rural hospitals, nurses and allied health professionals. Analysis of usage from web logs was followed by more specific case studies looking at the influence of professional and organisational factors on the use of CIAP. A state-wide survey was undertaken to investigate the awareness of the CIAP program and use of online evidence systems. An attempt at quantifying the impact on clinical practice was also made using the critical incidence technique and the journey mapping technique.

The CIAP study concluded that a large proportion of the clinicians did use CIAP once they were aware of the program. Doctors appeared to be the biggest users. Considerable variation in use was found and correlated to professional, organisational and team factors. Technical issues were not as important, once the technology was in place. Social and cultural factors were found to most discriminating in determining CIAP use. CIAP was used to support clinical work and many reported direct experience in its use improving patient care. The study concluded that more research needed to be done to understand the economic value of such improvements.

THE NATIONAL ELECTRONIC DECISION SUPPORT TASKFORCE REPORT (NEDST, 2003)

The National Electronic Decision Support Taskforce reported on a number of *perceived* barriers to the uptake of EDSS in clinical practice. The barriers were classified along the lines of barriers related to characteristics of EDSS, barriers related to characteristics of EDSS users, barriers related to characteristics of EDSS support system implementation and barriers related to characteristics of the organization and the environment.

The report concluded that many barriers were related to lack of resources and end-user attitudes. Respondents to the study cited lack of incentives for health care professionals to learn how to use EDSS in routine practice. Comparisons of the views about EDSS expressed by general practitioners, systems evaluators and systems developers showed some asymmetry in the value placed on individual barriers. Of the groups involved, GP's were more concerned with EDSS reliability and their security and privacy than were IT developers. On the other hand, IT developers expressed dissatisfaction with the clinicians' reluctance to change work practices. All groups, however, reported concerns with the quality of the knowledge contents available. Of all the discussions, it appeared that each group identified the top barriers to uptake as cost and lack of IT skills.

BARRIERS TO THE USE OF EDSS IN CLINICAL DECISION MAKING

This section will provide an analysis of the barriers identified in the Taskforce Report, (National Electronic Decision Support Taskforce, 2003), and some analysis of the evidence of each barrier from the experience of the CIAP project.

In addition, any new barriers identified by the CIAP study and new barriers identified in the literature after the completion of the Taskforce Report will be noted and described.

An Update on Barriers

In researching for updates to information about barriers to uptake of EDSS, we only used reports and published material dated after 1 January 2003 on the basis that the Taskforce Report, publishing in 2002, was up to date at the time of publication.

The Literature

- a) Bodenheimer and Grumbach (2003) report that e-health often takes too much time and is too expensive; the quality of Web-based medical information is inadequate; software programs may not interact with one another; patient privacy must be protected; public and private insurers rarely pay for electronic communication with patients; and the computer could interfere with the patient-physician relationship. Studies have shown that some computerized systems, such as reminder prompts and physician performance feedback, may improve physician performance and patient outcomes, but if these systems are too time-consuming, physicians may not use them. If primary care practices are to benefit from the electronic revolution, they must redesign their clinical processes to ensure that e-health facilitates rather than hinders the work of physicians.
- b) Magrabi *et al* (2003) document lessons learned from the QuickClinical¹ trial. In relation to barriers to uptake, the trial found that:
 - Clinicians have consistently reported poor access to evidence, such as MEDLINE, is a significant barrier to its use;
 - The use of information retrieval products varies across clinical settings and thus systems need to be designed and implemented to adapt to the specific needs of different clinical contexts;
 - The question of fitting products such as QuickClinical into a workflow had inconclusive results. Some clinicians were enthusiastic, others expressed ambivalence, others preferred their current sources of information. There was comment about the lack of time and patients' reactions to searching during consultations. These results reflect concerns about the human factors associated with the use of these styles of products;
 - In relation to the effectiveness of information retrieval systems, the trial identified a challenge clinicians face in knowing when to stop searching, when they have retrieved the 'right' answer. In library systems, this is often related to the familiarity the searcher has with the sources being searched. Such familiarity may represent a significant barrier to uptake of EDSS – the reluctance to change.
- c) A subsequent paper (Magrabi *et al*, 2004) reports that reasons for not pursuing information include lack of easy access to reliable up-to-date evidence and difficulty in formulating search strategies. In addition, barriers are reinforced by poor question formulation, limited searching expertise and skill in identifying relevant resources to obtain useful information in the context of providing care.
- d) Ahearn & Kerr (2003) reports results of a trial of prescribing software in a GP environment. They report seven themes of barriers, as follows:

¹ QuickClinical is a medicine-focussed online retrieval system developed by the Centre for Health Informatics
Electronic Decision Support Systems Action Planning Report

- Theme 1: Reaction to prompts

GPs found some of the prompts (particularly drug-interaction alerts) annoying or unhelpful, and often ignored or skipped over them. However, it was acknowledged that in some circumstances the prompts were helpful or essential in managing a patient (eg, when known allergies meant certain drugs were contraindicated).

- Theme 2: Concerns and potential problems

Concerns over the comprehensiveness, accuracy and evidence base of the information in alerts predominated. The deficiencies of existing systems were raised: for example, some GPs were aware of important interactions that were mentioned in printed textbooks but were not picked up by the interaction checking facility of their prescribing software. Another concern was the lack of alerts (in all but one software package) relating to drug contraindications for patients with certain diseases.

- Theme 3: Effects on prescribing behaviour

GPs perceived that prompts had positive effects on their prescribing behaviour, such as increasing their awareness of patient allergies that would preclude the prescription of certain drugs. Prompts were sometimes useful to educate patients, assist with compliance or facilitate interaction with a patient.

On the other hand, GPs felt that desensitisation to alerts could increase the danger of missing an important interaction alert or other useful information.

- Theme 4: Need for training

Some GPs were concerned that they did not have sufficient training to make use of all the decision-support features available in their software program, such as diabetes registers, customisable fields (ie, features that can be changed to suit the individual GP's requirements) and reporting systems. Consequently, many GPs used their prescribing software simply for prescribing.

- Theme 5: Helpful features of decision-support systems

The features of decision-support systems that GPs found helpful included sensitivity settings for drug interaction alerts, having the default setting on the "cancel" button (instead of the "OK" button) for prompts about serious interactions (thereby preventing the user from easily overriding the alert, intentionally or by accident), and having important warnings appear in red.

- Theme 6: Suggested improvements

GPs had a number of suggestions for improving the functionality or "user-friendliness" of the software they were using, in order to streamline their work processes and improve their ability to care for patients.

- Theme 7: Attitudes to evidence-based guidelines

Ease of access and seamless integration of guidelines into software packages dominated the discussions on this theme.

- e) An Australian report into the implementation of Information and Communication Technologies (ICT) in aged care² identifies six broad issues influencing uptake of ICT, namely;
- Infrastructure/Broadband connectivity. This is assumed to be less of a barrier than traditionally thought as broadband costs decrease and broadband availability improves;
 - The value of ICT and return on investment. The value of ICT to aged care homes has been underestimated although the over-hyped claims by vendors has raised general distrust of the reliability of the technology. All this raises questions related to the return on investment;
 - Change management. The greatest challenges to the uptake of ICT are more likely to be people or organisational in nature. Effective change management therefore becomes a priority;
 - The current level of ICT skills in the sector. The traditional lack of emphasis on technology in the aged care sector has led to the situation of a limited base of required ICT skills. This emphasises the importance of change management and training if uptake of technology is to escalate;
 - The availability of appropriate software, a general issue across the health sector. The aged care area does have specific requirements that will have to be negotiated through collaboration between the sector and the ICT sector;
 - Balancing external drivers against facilities' internal needs. External drivers, such as government, do not necessarily correspond with the internal business needs of aged care facilities. Such discrepancies will have to be addressed for the various external drivers in operation to maximise the uptake of ICT.
- f) The *HealthConnect* project (HealthConnect, 2003) reports on the following set of issues to be overcome for a successful implementation:
- Privacy, security and confidentiality;
 - Acceptance of health professionals and others;
 - Actual implementation;
 - Technical Issues;
 - Level of investment and political commitment required.

Like the aged care report discussed above, the majority of these issues are human factor and not technical although each will have a technical dimension in its resolution. This, again, mirrors the lessons learned in the CIAP evaluation, once the technology is in place it ceases to be a major barrier.

- g) A Canadian report (Gainer *et al*, 2003) cites barriers to uptake (of evidence) as lack of useful evidence, lack of consensus, lag time in diffusion, overwhelming amounts of information, decisions made without considerations of health outcomes, differing and changing values, lack of accountability, tradition and judgment, privacy and confidentiality of information and uncoordinated development of health information systems. In the Australian context, it is proposed to increase the use of evidence in decision making through the adoption of EDSS, that base their decisions on evidence accessed by the system. Thus these barriers will play a major part, especially those related to the nature of the evidence itself – when is something evidence for distribution, or the time lag between different distribution methods. Barriers such as tradition and judgment require a change management response. Some of the barriers may in fact not be barriers to uptake of EDSS but represent difficulties to the software developers, such as the amount of evidence, changing values, etc. These will affect what evidence is inserted into EDSS and the issue for the health professional is the evaluation of the efficacy of the evidence in making good clinical decisions.

² *Implementing ICT in Aged Care: The Challenges*, discussion paper for National eHealth Aged care Forum, Hobart, April 2004, personal communication, Steve Tipper (s.tipper@unsw.edu.au)

- h) At the 4th National Knowledge Forum, Robertson (2003) reported three barriers to the use of clinical evidence (and hence EDSS), emotional (cultural), skills and resources. The resource barrier is addressed, as found in CIAP, through access to appropriate systems but the cultural and skills barriers remain to be addressed. The skills barrier is addressed through appropriate training but the predominant clinical culture seems to be at odds with evidence based practice. This requires a clinician to acknowledge that they may not know the answer, a difficult admission under the best of circumstances. Robertson reports that the development of a questioning culture does not provide people with the skills to ask answerable clinical questions and to integrate the evidence they find into clinical practice. This may present a considerable barrier to the uptake of EDSS – clinician opinion is not something that can easily be overcome, except through, say, a legislative requirement.
- i) Rousseau et al (2003) report on a longitudinal study on the use of EDSS in a clinical setting and conclude that significant barriers exist for the use of such systems by general practitioners. Key issues include the relevance and accuracy of messages and the flexibility to respond to other factors influencing decision making in primary care. The system did not fit well into a general practice consultation and did not compare favorably with other ‘on demand’ services. The feedback received indicated concerns about when guideline content was presented in the consultation process (in some cases, inconsistent coding meant guidelines content was presented which had no relationship to the problem with which the patient presented), the ease of use of the system and the helpfulness of the content. In each case, this flags issues with the system’s design and may reflect poor understanding of the requirements in a general practice by the software developers. Overall, the system was not deemed helpful, despite clinicians persevering with it.
- j) Hagland (2003) reports that the biggest barrier to uptake is physician behavior because most physicians are not employees and cannot easily be coerced into using EDSS they don’t like.
- k) Leung *et al* (2003) report on a study in Hong Kong on the computerisation of clinical practice. They conclude that time costs, lack of technical support and large capital investments were the biggest barriers whereas improved office efficiency and better-quality care were ranked highest as potential incentives to computerize. Cost vs. non-cost, physician-related vs. patient-related, and monetary vs. non-monetary factors were the key dimensions explaining the barrier variables. Similarly, within-practice vs external and "push" vs. "pull" factors accounted for the incentive variables.
- l) Ely *et al* (2003) reports on the findings of a study into obstacles encountered by doctors in asking questions about patient care. Amongst the most salient features reported were inadequate time to search for information, failure of the resource to address the topic and inadequate synthesis of multiple bits of evidence into a clinically useful statement. Practising doctors also reported they were unlikely to pursue their questions because they doubted the existence of useful information in available resources. The following details the classification they made of the various obstacles.

1. Obstacles related to recognising an information need

1.1. Doctor's lack of awareness of an information need. The doctor makes decisions about patient care, completely unaware of a gap in knowledge.

1.2 Doctor's suppression of a recognised information need. On some level the doctor is aware of a gap in knowledge but suppresses it due to time pressures, embarrassment, personal characteristics, or characteristics of the clinical setting.

2. Obstacles related to formulating the question

2.1. Inability to answer patient specific questions with general resources. Patient specific questions (“What is this rash?”) and vague cries for help (“I don't know what to do with this patient”) cannot be answered by a general resource.

2.2. Missing patient data requiring unnecessarily broad search for information.

Questions that include demographic information, clinical information, and patient preferences may help focus the search and shorten the answer. The type of patient data that would help varies depending on the question and may not be apparent until the search for an answer is under way.

2.3. Uncertainty about the scope of the question and unspoken ancillary questions. It may not be clear whether the original question should be broadened to include potential ancillary questions. The answer to “What is the antibiotic of choice for pneumonia in a 5 year old?” could include ancillary prescribing information (for example, dose, adverse effects) thus avoiding the need to consult a second resource. An intermediary searcher may not anticipate such ancillary questions.

2.4. Obstacles related to modifying the question

2.4.1. Uncertainty about changing specific words in the question. The doctor may ask a question using words that lead to difficulties in the search for information. For example, the word “sciatica” is less conducive to a literature search than “low back pain.”

2.4.2. Unhelpful modifications resulting from flawed communication between the doctor and searcher. The real information need may be lost as it is communicated from the doctor to an intermediary searcher, such as a librarian.

2.4.3. Need for modifications apparent only after the search has begun. Often a helpful modification to the original question becomes apparent only after the search for information is under way and the searcher learns more about the topic.

2.4.4. Difficulty modifying questions to fit the PICO format (patient, intervention, comparison, outcome). Sackett et al suggest four elements for clinical questions: patient or problem, intervention, comparison, and outcome. However, many clinical questions do not involve interventions, comparisons, or outcomes.¹⁰

3. Obstacles related to seeking information

3.1. Failure to initiate the search

3.1.1. Doubt about the existence of relevant information. A search may not be initiated because the doctor doubts the existence of relevant information or doubts that any information found would change the plan of care.

3.1.2. Question not important enough to justify a search. For example, the work of searching may not be justified if the question was motivated more by curiosity than by patient care.⁸

3.1.3. Lack of time to initiate search. Practising doctors have only a few minutes to answer their questions,⁹ but extensive time consuming searches are often required to adequately answer clinical questions.

3.1.4. Ready availability of consultation which leads to a referral rather than a search. Practising doctors may refer patients to consultants if they believe excessive time and effort would be required to learn enough about the problem to feel comfortable managing it themselves.

3.2. Obstacles related to the search for information.

3.2.1. Uncertainty about where to look for information. It can be difficult to decide which resources will be most helpful and what should determine the selection of resources. Time available? Familiarity with resource? Type of question?

3.2.2. Less than optimal strategy due to lack of searcher skill. When the searcher lacks skills for searching the literature or lacks familiarity with the internet, relevant

information may be missed.

3.2.3. Uncertainty about which order to search resources. After selecting potentially helpful resources it may not be obvious in which order to search these resources or what should guide the order (physical accessibility, resource quality, time available, etc).

3.2.4. Uncertainty about narrowing the search without missing relevant information. When faced with an overwhelming body of knowledge about a topic, it may not be clear how to narrow the search (for example, during a Medline search) without losing relevant information.

3.2.5. Uncertainty about which articles to read thoroughly and how thoroughly to read them. It is often not clear how to select resources, such as journal articles, for thorough reading. Should the decision be based on the title, the abstract, the prestige of the journal, other factors? Once an article has been selected for more thorough reading, how thoroughly should it be read and how can the needed information be found without reading every word.

3.2.6. Uncertainty about the adequacy of the search (when to stop searching). Often it is not clear when to stop searching for information. When can the question be answered adequately? How can it be known that all the important evidence has been found?

3.2.7. Uncertainty about the meaning of null search results. If no interaction between two drugs is listed, does that mean no interaction exists? If a relevant article makes no mention of treatment for a disease, without explicitly stating that there is no treatment, does that mean there is no treatment?

3.2.8. Inadequate indexing of databases used for computerised literature searching. For example, a MeSH term for the topic of interest might not exist or a relevant article might not be indexed under the intuitive MeSH term.

3.2.9. Lack of time to search adequately. Once initiated, the search for information may be suboptimal because pressures on time lead to a poor choice of resources.

3.3 Obstacles related to knowledge resources (for example, books, journals, computers)

3.3.1. Resource physically distant. The resource may not be readily accessible to the doctor.

3.3.2. Topic or relevant aspect of topic not included in a resource that should logically include it. Based on the title of the article or book, coverage of the topic would have been expected.

3.3.3. Inadequacy of the resource's index. The topic may be covered in the text of a book or computer resource but not listed in the index. The topic may be listed in the index but not under an intuitive entry. The index may be inadequately cross referenced.

3.3.4. Resource poorly organised. Resources may be poorly organised within a personal library or reprint file. Information within a resource may be poorly organised or have inadequate titles or subtitles.

3.3.5. Resource not clinically oriented. For example, textbooks are often organised by disease rather than by clinical findings, which forces the doctor to “work backwards.”

3.3.6. Obstacles related to computers (hardware and software problems). Bugs, slowness, unintuitive software, internet problems.

3.3.7. Difficulty accessing resources in libraries. The library may not hold the needed journal or book. The needed volume may not be on the shelf. Journal supplements are often difficult to find or missing.

3.3.8. Resource not authoritative or not trusted. The resource may not be authoritative or

it may not be trusted by the researcher

3.3.9. Resource not current. The resource may not be current or it may be difficult to know if it is current (for example, undated internet sites and printed material).

3.3.10. Inability to interact with a general resource as one could with a human resource. Most general resources do not allow real time interaction with the searcher as could happen with a human resource. There can be no follow up questions.

3.4. Obstacles related to information within resources

3.4.1. Incorrect information. The information simply may be wrong.

3.4.2. Information not current. The resource containing the information may or may not be current, but the information itself is not current.

3.4.3. Failure to anticipate ancillary information needs. There is inadequate anticipation of likely ancillary or follow up questions (for example, the name of a recommended drug is provided but not the dose, forcing the searcher to consult another resource).

3.4.4. Failure to address common comorbid conditions. The information refers to patients in general but does not account for common comorbid conditions or the question is answered for patients with a comorbid condition but not for patients in general.

3.4.5. Inadequate differential diagnosis. A differential diagnosis consists of a list of diseases with little information about how to distinguish among the possibilities.

3.4.6. Failure to define important terms. The information includes terms that are not defined. For example, treatment may vary depending on whether the disease is mild, moderate, or severe, but these terms are not defined.

3.4.7. Inadequate description of clinical procedures. A clinical procedure (for example, thoracentesis) is described but there is insufficient detail to allow the doctor to do it.

3.4.8. Vague or tangential information. The information does not allow the question to be answered directly because of a vague, tangential, or overly general format.

3.4.9. Unnecessarily cautious writing style. The information is overly cautious and may contain unnecessary hedge words (“can,” “may,” etc). The caution may be legitimate (inadequate evidence to support a definitive statement), but it may be unnecessary.

3.4.10. Tertiary care approach to primary care problem. Available information may take an urban interventionist tertiary care approach, which may not be useful to a rural primary care doctor with a non-interventionist philosophy.

3.4.11. Biased information due to conflicts of interest. The author or editor may have conflicts of interest.

3.5. Inadequacy of available evidence

3.5.1. Failure to address the clinical question. Available studies have not adequately addressed the question (for example, “Is smoking a risk factor for sinusitis?”).

3.5.2. Failure to study the comparison of interest. Drug companies often sponsor clinical trials comparing drug A with placebo, but the question is whether drug A is better than drug B.

3.5.3. Failure to study the outcome of interest. An intermediate outcome, such as serum cholesterol level, may be studied rather than more clinically important outcomes, such as myocardial infarction or death.

3.5.4. Failure to study the population of interest. It may not be appropriate to apply results from a referral population to the primary care setting.

3.5.5. Evidence based on flawed methods. Multiple flaws (for example, selection bias, misclassification bias, confounding, etc) may invalidate the results.

3.6. *Obstacles related to the use of available evidence*

3.6.1. *Failure to cite or include relevant evidence.* Evidence exists but is not cited. It may be difficult to know if evidence exists and, if it exists, to what extent it has been used to write a chapter or review.

3.6.2. *Inadequate synthesis of multiple bits of evidence.* Relevant evidence is available but consists of numerous bits of information that have not been synthesised or interpreted. Evidence may be summarised but not systematically or rigorously. Conflicting evidence is presented without providing a definitive recommendation for the clinician who must make a decision.

3.6.3. *Difficulty applying results of randomised clinical trials to individual patients.* Clinical trials are often narrow in scope and may not apply to patients with comorbid conditions

4. Obstacles related to formulating the answer

4.1. *Failure to directly or completely answer the question.* Once the relevant information has been gathered, the searcher fails to directly or completely answer the doctor's question (for example, owing to the inadequacy of available information or an inadequate synthesis of adequate information).

4.2. *Answer too long or too short.* The answer is too long to be helpful to a busy doctor or too short to completely address the information need.

4.3. *Answer directed at the wrong audience.* Answers for patients may not be helpful to doctors.

4.4. *Difficulty addressing unrecognised information needs apparent in the question.* It may not be clear how to address unrecognised information needs that are evident in the question. For example, the question might ask about the dose of a drug that is contraindicated (“What is the dose of tetracycline for acne in a pregnant woman?”).

4.5. *Discomfort of non-clinician searcher (for example, librarian) formulating an answer to be used in patient care.* Intermediary searchers who are not doctors (librarians, nurses) may be comfortable providing information on a given topic but not formulating an answer that would direct patient care.

5. Obstacles related to using the answer to direct patient care

5.1. *Answer not trusted.* A seemingly adequate answer may not be used if the doctor does not trust the source.

5.2. *Answer moot or no longer needed.* The answer may be moot or irrelevant because it came too late or the patient improved or got worse before the answer could be applied.

5.3. *Answer inadequate.* If the answer is thought to be inadequate by the doctor, it may not be used to direct patient care.

Table copied from Ely *et al* (2003)

Even a quick review of the table indicates that most obstacles have little if any relation to technology but many of them can be reduced through the application of appropriate technology. In addition, education and training seems to be a major enabler, potentially reducing many of the obstacles.

ADGP (2002) presents analysis of a needs-analysis undertaken by the Australian Divisions of General Practice. The report provides a pessimistic view of the use of IT in the GP sector acknowledge to be one of the most advanced sectors in the uptake of IT.

Reasons for clinical usage of electronic information systems	
Reason	Frequency of response (from 114 Divisions)
<i>Clinical</i>	
1. Electronic prescribing	65
2. Clinical record keeping	54
3. Patient recall systems	29
4. Patient referral letters	11
5. Patient education	10
6. Drug interaction prompts	9
7. Health assessments	9
8. Better access to information	8
9. Clinical support tools	4
10. Patient health summaries	3
11. Patient databases	3
12. Preventative health prompts	3
13. Clinical audits	2
14. Travel medicine information	1
15. Drug use management	1
<i>Management</i>	
16. Patient billing systems	53
17. E-mail and Internet	50
18. PIP incentives	9
19. Ease of practice management functions	7
20. Word processing	4
21. Storing reports and results	3
22. Health provider directories	2
23. Better integration with hospitals and specialists	2
24. ACIR	1
25. Stock control	1
26. Monitoring of patient outcomes	1

Barriers	Frequency of Response (from 114 Divisions)
<i>Professional</i>	
1. Cost and resourcing	52
2. Time to learn	50
3. lack of IT skills	47
4. Lack of education in IMIT	18
5. Security and privacy concerns	7
6. Lack of confidence in using system	5
7. Salaried with State Health or AMS	1 (ie. Different systems and requirements)
<i>Personal</i>	
8. Fear of new technology	31
9. Rapid pace of & resistance to change	12
10. GPs near retirement	7
11. Lack of typing skills	7
12. Cannot see any advantage	4
13. High turnover of GPs	1
<i>Physical/Technical</i>	
14. Lack of IT support	41
15. Patient demographics	39
16. Can handle loads using other means	26
17. Too much choice	21
18. System reliability	9
19. Connection speed	3
20. Physical barriers in remote areas	1
21. Cost of connections	1
22. Continuity of electrical supply	1

Source: Australian Divisions of General Practice Ltd, Information Management Coordinator IM in GP Stocktake/Needs Analysis Report – 3 April 2002.

Available at http://www.adgp.com.au/client_images/1726.pdf.

The figures show that the majority of uses for IT are not decision making in themselves, with prescribing functions taking the main role, followed closely by clinical record keeping.

For the barriers, these figures concur with other findings in this area: the main barriers are not technical but human factor related, training, ease of use, familiarity, etc.

The National Electronic Decision Support TaskForce Report, 2003

The National Electronic Decision Support Taskforce report (2003) reports on a number of barriers and enablers to the uptake of EDSS in the health industry. This section provides a list of identified barriers, and for each identified barrier, details what the Taskforce report says for the barrier, what (if anything) the CIAP study found in relation to this barrier and what NICS could do to lessen this barrier. The latter is addressed in three dimensions; is resolving the barrier in NICS' work space; what can NICS do to address the barrier; and should reducing the barrier be in NICS' work space.

Barriers and enablers should be considered similarly to SWOT (Strengths, Weaknesses Opportunities and Threats) elements, any issue could be one, the other or both depending on context.

Barrier 6.1 – Quality and Safety Issues

Content

The content issues relating to quality and safety are about the quality of the underlying knowledge base used in the EDSS. Issues are whether knowledge bases have been translated accurately into electronic form, whether they are based on evidence, whether they have been peer reviewed, whether there have been trials to test the rules, the date the evidence was made available, the ability to use the latest available evidence, and how frequently evidence is updated.

What are the lessons from the CIAP study

Not addressed in the CIAP study

What NICS could do to lessen or remove this barrier

This barrier is related to the nature of the content in the EDSS and as such is outside NICS' remit. To address this barrier would require NICS becoming a content policeman and this is not a natural role for the organization. It would require extensive resources and reach, beyond NICS' capabilities at present. Professionally, NICS cannot certify content and leaves that to more appropriate organizations.

NICS could provide guidance about what content should be available and about what contributes to better practice. This could be achieved through a measured investment in a web site and marketing activities to advertise the web site. A small budget would also be required to effect web site maintenance and updates but because the information is about content and not the content itself, it is likely that updates would be minimal (maybe once or twice a year).

As an alternative strategy (or maybe a complementary strategy), NICS at present makes available certified evidence through the Cochrane database. NICS is also evaluating making available the BMJ Clinical Evidence database along similar lines, to Australian clinicians. This activity could be expanded to incorporate other approved databases and thus NICS creates an Australian portal for evidence. This does not require NICS to authorize databases but relies on others to provide such authorisation and stamps of approval.

Systems

The systems issues identify that the interface between clinicians and developers of EDSS is a key concern. Also, the robustness of the EDSS is paramount. These issues indicate that the EDSS must be developed with the environment/context in which it will be used driving the design and development. Context includes not only physical characteristics of the work environment but also consideration of the way in which work is organised and the organisational and professional culture of those for whom the EDSS is designed. This may indicate the development of different EDSS to suit different environments within

the health sector. Such diversification of systems adds special weight to the requirements of standardisation and, in particular, compatibility.

What are the lessons from the CIAP study

Differences between hospitals' and professional groups' (doctors, nurses and allied health) use of the online evidence system could be explained by organizational, professional and cultural factors. These included the presence of champions, organizational cultures which supported evidence-based practice, and database searching skills of individual clinicians. For example the extent to which nurses believed information seeking was a legitimate part of their clinical role influenced their use of CIAP. The clinical roles of senior and junior medical and nursing staff also influenced how they used CIAP.

What NICS could do to lessen or remove this barrier

This barrier relates to the quality of the EDSS implementing evidence-based decision support.

NICS has a role that it could play in lessening this barrier.

It can promote best practice in software development. It could achieve this by educating software developers through regular discussions and newsletters, through supporting specific workshops hosted by higher education organizations, such as TAFE, universities, etc. It can create a web site for providing advice to developers, although much of this information is already available to developers but may be ignored for cost of development reasons. The message delivered may be in the form of guidelines for development and especially, guidelines for the development of guidelines.

NICS could also sponsor the investigations into what makes a good evidence based EDSS system as this information is not held in a single place but resides in various locations throughout the IT industry. The collation of this information and experience should support the web site and any training activities.

Any adoption of this role would necessitate catering for change management. It requires investigation into what would change the practice of an IT developer to adopt best practice for the clinical environment. A question arises – is the Australian marketplace large enough to provide the requisite return on investment? If not, then a developer may require international sales, which may require the development of product at odds with Australian requirements.

Encouraging change would also require investigation into the clinical workflow. The CIAP experience indicates that different forms of an EDSS system may be required to suit various types of clinicians. This makes further demands on the return-on-investment equation.

NICS should sponsor the development of an evaluation tool, matching EDSS product capabilities against clinical setting requirements. This tool, similar to, say, the Bobby accessibility rating for web sites (<http://bobby.watchfire.com/bobby/html/en/index.jsp>), could include an approval stamp for inclusion into compliant software.

Testing

There is a generally agreed lack of thorough testing of the content, internal processing, content delivery and production processes of EDSS. Such comprehensive testing is required to ensure the quality and safety of such systems.

What are the lessons from the CIAP study

Not addressed in the CIAP study

What NICS could do to lessen or remove this barrier

This barrier is completely outside NICS's remit and capabilities. It relates to the testing of EDSS applications and as such is a concern of the software developers.

NICS can raise the importance of this issue in other forums. The EDSS evaluation tool may have some impact on this barrier but any impact is likely to be minimal.

Barrier 6.2 - User Acceptance Issues

Effort and Process

Ideally, the process of using an EDSS should save the clinician time and money. Clinicians expect a productivity improvement. Improved outcomes is also a strong motivator.

What are the lessons from the CIAP study

The CIAP study showed:

- Lack of time and staff shortages did not appear to be a barrier if the clinicians were highly motivated to seek information (Gosling & Westbrook, 2002)
- General computer skills were an enabler to use CIAP
- Point of care access increased frequency of use
- Views about the role of information-seeking and EBM in clinical practice influenced use
- Overall doctors rated CIAP as easy to use, but junior doctors found it easier to use and reported greater access to technical help than did senior doctors.
- While many clinicians report lack of specific training in the use of CIAP to be a barrier to use, most use it despite an absence of this training. Only for nursing staff was there a relationship found between CIAP training and more frequent use of CIAP.
- 73% of doctors who used CIAP found all/most of the information sought and 74.0% found search time to be excellent/good.

What NICS could do to lessen or remove this barrier

This is a major issue with respect to the training requirements of current and new clinicians. Improved outcomes will only result from the efficient and effective use of EDSS within the clinical workflow. So, appropriate training is paramount to overcoming this barrier.

Some professions are already further along the way than others and so NICS might wish to establish an activity analysing the requirements of the various professions and devising suitable training requirements and resources for those professions. This should be done in concert with existing training providers so as not to duplicate existing infrastructure.

NICS already runs training sessions for clinicians and these should continue and change with the lessons learned from the scoping exercise.

NICS should establish a solid network into each training institution and professional college and facilitate the bridging of college and professional requirements with training providers.

Confidence in the Knowledge Base

Clinicians will not use a system they regard as unduly directing them other than on the basis of independent peer reviewed research. They regard access to that research as a necessary feature of the system. They expect that the knowledge within such systems must match that of the most trusted experts within each area of clinical practice. They require accurate translation of the knowledge base into an electronic format. Clinicians argue that many systems are limited because of the quality of the data entered and the failure to reflect local patient mix and practice patterns. Confidence in the knowledge base could be improved with formal evaluation of the knowledge base.

What are the lessons from the CIAP study

The CIAP study showed: CIAP included content familiar to most clinicians

- Medical staff used CIAP at double the rate of nursing staff (Westbrook & Gosling, 2003). Allied health often reported a lack of appropriate content for their clinical practice and raised concerns that at times it was not clear whether the content was sparse or their search skills were inadequate to find the information needed. CIAP has subsequently vastly increased the data base content.
- Among allied health staff for example use was greatest by pharmacists as the content provided matched their clinical needs.
- Clinicians' reports of CIAP use, actual patterns of searching behaviour and detailed study of specific examples where CIAP was used demonstrated that among active users, the full impact of CIAP to influence clinical practice is being achieved (Westbrook & Gosling, 2003). For example 93% of doctors reported that they thought CIAP had the potential to improve patient care and 55% reported that they had direct experience of this.
- CIAP has a companion role in helping healthcare providers recommend efficient as well as informed choices (Westbrook & Gosling, 2003) We found that clinicians used CIAP to fill not only their personal information needs but also to provide more full information to patients.

What NICS could do to lessen or remove this barrier

This barrier related back to the previous barrier relating to confidence in the quality of content. Similarly, NICS has little carriage of this barrier.

Comfort with the System

Clinicians need to feel ownership of the EDSS.

What are the lessons from the CIAP study

The CIAP study showed:

- CIAP was more successfully integrated into doctors' everyday work because it fits well with an evidence based medicine approach and the work tasks of clinicians such as supporting decisions about diagnosis and treatment. For nurses integration of CIAP was greatest where its use matched the clinical tasks required. For example 82% of clinical nurse consultants reported that they thought use of CIAP was a legitimate part of their clinical work compared to only 46% of RNs.
- The most frequently reported reason for not using CIAP was lack of training. (Gosling & Westbrook, 2002)
- Nurses seem most tentative about using computers without training and they appear to be the group where encouraging use is most problematic. (Gosling & Westbrook, 2002)

- Specific training in the use of CIAP appeared most effective for nurses as those who had received training were more likely to report that they found the information they needed (Gosling & Westbrook, 2002b). The development of CIAP was viewed as a bottom up approach where clinicians drove the design process and thus they gained ownership of the process from the beginning.

What NICS could do to lessen or remove this barrier

Different perceptions between doctors and nurses is an important area that NICS is interested in.

Addressing this barrier provides opportunity to broaden meaning of 'comfort' to include different professional subgroupings and their views of EDSS, their involvement, use of the system, etc.

NICS may have to commence a marketing and legitimization activity to convince organizations and professionals of the benefit of EDSS in their workflow and the positive effects on patient care. This marketing must convince clinicians that time spent on EDSS systems is not time wasted but represents an investment in the overall improvement of patient care and outcomes.

Comfort can be maximised by ensuring that EDSS systems are designed around the needs of the various clinical groups, as discussed above. An important component of this is meeting the training requirements, as indicated through the CIAP evaluation.

A major lesson to be communicated is that allowing access today is an investment in a more competent and trained staff. Returns come later.

Patient Issues

Patient issues reflect a concern with the attitude of patients to the use of IT in their care plan. This is essentially a human-factors problem reflecting general anxiety about the much-publicised and popularly held idea of the takeover by IT of decision and monitoring tasks. Clinicians are rightly concerned with the attitudes of their patients to the introduction of new technologies. As the basis of their main cash flow, any negative impact on patient numbers can severely impact practice viability.

Some patients will resent the introduction of IT into their relationship with their clinician. Of those, some will continue to resent such intrusion no matter what the clinician does to assuage their fears. Some patients may like it, for example, being able to email their doctors, not having to recount medical history etc.

What are the lessons from the CIAP study

The CIAP study did not study patients' views of CIAP use. It did show that CIAP was used by clinicians as a source of information for themselves and for patient education.

Doctors were the group most likely to report having direct experience of CIAP use resulting in improved patient care. (Gosling & Westbrook, 2002b)

What NICS could do to lessen or remove this barrier

This barrier represents a major opportunity for NICS. Like clinicians, patients must see the benefit of the inclusion of EDSS into their care. Currently it is arguable if they do. Suitably designed EDSS may be attractive to patients themselves and assist in breaking down their resistance to the use of technology. Patients are already comfortable with the use of high technology equipment such as scanners, etc. They can similarly, be conditioned to accept the use of EDSS.

Patient focused EDSS can form a part of more general patient education environment, allowing patients to explore treatment opportunities in their own time and generally become better informed about their

treatment options. This empowers patients to be well informed through access to authoritative evidence. NICS is already doing this by making available the Cochrane database, but in its present form, this may represent a large cost for little patient gain.

Availability

The EDSS needs to be available at the point of care.

What are the lessons from the CIAP study

The CIAP study showed:

- 61% of doctors who used CIAP did so near to where they treated patients and they reported that this location constituted about 60% of their total usage.
- Senior doctors used CIAP at home more than junior doctors and also in offices within their hospital
- One third of clinicians exclusively used CIAP at the point of care (Gosling & Westbrook, 2002b)
- 32% of users reported their use of CIAP occurred at other places in the hospital (Gosling & Westbrook, 2002b)
- Those clinical staff who did not have access to CIAP near to where they treated patients identified this as a barrier to use.

What NICS could do to lessen or remove this barrier

The availability of EDSS is not within NICS power to affect. Decisions about the implementation of EDSS within a practice or the availability of broadband are issues that NICS cannot directly affect. NICS could only provide suitable marketing opportunities to positively affect the uptake of EDSS.

Organisational Impact

The implementation of EDSS has significant impact on the organization and workflow. Failure to address such issues results in fewer anticipated benefits. Specifically, the Taskforce report details the following issues:

- Management and clinical support and leadership – Failure of the implementers to engage with the users has been shown to contribute to poor acceptance of a system.
- Identification of changes in work practices and workflow prior to system implementation and redesign of these.
- Sufficient implementation budget.
- Alignment of EDSS implementation with strategic direction of the hospital and EDSS viewed as a means to improved patient care.
- Ongoing evaluation to assess effect, particularly any negative impact of system on quality of care indicators.
- Dissemination and discussion of realistic benefits of EDSS.
- Clinical involvement in the development of customisable components.
- Training just-in-time.
- Awareness of the risk of over-alerting.
- EDSS recognised as part of overall organizational culture change.

What are the lessons from the CIAP study

The CIAP study showed:

- Clinical teams that worked well together reported greater impacts of the use of CIAP in terms of reported experience of improved patient care following system use. (Westbrook & Gosling, 2003)
- The extent to which the professional and organisational cultures encouraged information seeking and legitimised it as part of the professional role of staff members was a major influence on the use of CIAP. (Gosling & Westbrook, 2002)
- Lack of time and staff shortages did not appear to be a barrier if the clinicians were highly motivated to seek information. (Gosling & Westbrook, 2002)
- Lack of organisational support for the use of CIAP and for information seeking were barriers. Having clinicians who championed, supported and encouraged use was a positive factor. (Gosling & Westbrook, 2002)
- The lack of awareness of CIAP, particularly amongst nurses, implied that encouraging nurses to use CIAP was a low priority. This was reflected in the differences in attitudes of the Directors of Nursing. (Gosling & Westbrook, 2002)
- Nurses seem most tentative about using computers without training and they appear to be the group where encouraging use is most problematic. (Gosling & Westbrook, 2002)
- Information seeking by some nurses was not perceived to be legitimate in work time. (Gosling & Westbrook, 2002)
- In some areas senior staff did not promote use. (Gosling & Westbrook, 2002)
- CIAP provided support for the socio-technical view of the integration of technology into organizations which emphasises the important role organisational culture has on uptake of technology. (Gosling & Westbrook, 2002)
- Nurses were least likely to have about or used CIAP. Doctors were the most frequent users. (Gosling & Westbrook, 2002b)
- Clinicians who thought that using CIAP was a legitimate part of their clinical role perceived they were in a team whose members used CIAP, reported support from the hospital and from their direct supervisor. (Gosling & Westbrook, 2002b)
- Doctors and allied health staff perceived higher levels of legitimisation of CIAP use that did nurses. They also perceived more support from their direct supervisors. (Gosling & Westbrook, 2002b)

What NICS could do to lessen or remove this barrier

NICS can address this barrier most effectively through the provision of appropriate training to clinicians and clinical organizations. NICS can lobby governments but as the policy of most governments already is to implement EDSS, there seems little requirement for any more lobbying.

One aspect where NICS may be effective is in changing the behaviour of industry leaders. Suitable information sessions targeting industry or thought leaders may have great benefit in changing the behaviour of organizations in adopting EDSS into their workflows.

Technology Issues

This is seen as a general issue applicable to any implementation of IT in a new sector. This barrier is usually described in terms of lack of IT expertise by practitioners, overall lack of IT infrastructure and IT support at the coalface. Any solution to this barrier requires a two-fold approach, namely the education

of practitioners in the appropriate use of IT in their workflow and the provision of relevant and appropriate IT and support infrastructure.

What are the lessons from the CIAP study

The CIAP study showed:

- Technical issues were not found to be the central factor influencing the use of CIAP. (Westbrook & Gosling, 2003)
- Although slow speed was mentioned as a hindrance, objective measurement demonstrated that this was not a primary barrier to use. (Gosling & Westbrook, 2002)
- However individuals will often report technical issues rather than organisational cultural issues as a barrier to IT use. These appear more concrete and tangible barriers.

What NICS could do to lessen or remove this barrier

This is essentially an infrastructure issue and as such outside NICS' remit. However, appropriate messages can be included in all training to highlight the positive effects of any investment in technology for the organization, the clinician and the patient.

Medico-legal Issues

The legal position of EDSS is largely untested in Australia. The new legal risks associated with the use of EDSS are largely unknown.

What are the lessons from the CIAP study

Not addressed in the CIAP study

What NICS could do to lessen or remove this barrier

NICS has an advocacy role in addressing this issue. NICS should sponsor workshops, information sessions, training, etc around legal issues as part of its normal work. NICS should also advocate into medical schools to ensure appropriate education and training is provided as part of general medical training.

Barrier 6.3 – Implementation Issues

National Standards

There need to be a set of nationally adopted standards, based on accepted international standards, to support the safety, efficiency and effectiveness of EDSS.

What are the lessons from the CIAP study

Not addressed in the CIAP study

What NICS could do to lessen or remove this barrier

Although NICS can have an advocacy and informing role, this barrier is generally outside NICS remit.

Seamless Electronic Business Process

A consistent approach is required to better realise the benefits of EDSS given that such systems interact with a wide variety of existing IT systems. If EDSS conflict with existing systems, such as back-end systems, then anticipated benefits will not accrue.

What are the lessons from the CIAP study

Not addressed in the CIAP study

What NICS could do to lessen or remove this barrier

This is not a barrier in NICS remit.

Sustainability of the Knowledge Base

The ownership of the IP of information converted into electronic form will influence the extent to which there is consistency in such information being available for delivery to health professionals.

What are the lessons from the CIAP study

Not addressed in the CIAP study

What NICS could do to lessen or remove this barrier

This is not a barrier in NICS remit.

Complexity of the Knowledge Process

There are key areas of knowledge that, if addressed consistently (format, terminology and index), would significantly improve their dissemination, representation in computer form and delivery to the clinical care setting across the health sector, and accelerate the development of EDSS.

What are the lessons from the CIAP study

Not addressed in the CIAP study

What NICS could do to lessen or remove this barrier

This is not a barrier in NICS remit.

Barrier 6.4 – Level of Investment

The health software industry currently lacks confidence that any future government investment or redirection of investment will not fall by the wayside.

What are the lessons from the CIAP study

Not addressed in the CIAP study

What NICS could do to lessen or remove this barrier

NICS only has an advocacy role in this barrier's resolution. Ensuring appropriate levels of investment is a political issue that is driven by political needs. Unless NICS becomes a political party it can have little direct effect in this area. Advocacy and general information provision may have peripheral roles in highlighting the importance of EDSS and evidence based decisions but in the last resort, political-will will prevail.

The AMA Medical Taskforce on Informatics Report

The AMA Medical Informatics Taskforce Report (Davey & Quinlan, 2004) investigated the use and the potential of informatics within the specialist clinician community.

As detailed in the report, the review examined the status of specialist informatics and found:

- The use of informatics varies greatly from specialty to speciality and within specialties. The findings from the interviews and surveys of the Medical Taskforce on Informatics members identified at least five functional areas for the use of informatics that were considered very important for the majority of specialists. These five functional areas include clinical record keeping for all patients; electronic transmission of investigation orders or referrals; chronic disease management/care planning/reminders/care pathways; surgical and other clinical audit; and risk management. Most specialties had a very low adoption of informatics in these five areas in their workforce, particularly in clinical areas.
- Although some colleges have a reasonable capacity to address informatics programs and support adoption of informatics in their specialty, this capacity is very limited because of minimal internal resources.
- There is very little involvement by specialist organisations or official representation on behalf of the specialties in the strategic planning or shaping of the broad health informatics agenda.

The review concluded that: Specialists were not well engaged in any of the important decision making processes around informatics by the various levels of government or industry. Initiatives are compromised because of the lack of input from specialists and currently the majority of informatics initiatives are being undertaken without due consideration of the impact on specialists.

The barriers to specialist use of informatics were seen as:

- Specialists are ‘time poor’ and don’t have the time to commit to learning new processes.
- Perception among specialists that computers take more time to do tasks.
- Connectivity issues are preventing specialists from achieving the many benefits of informatics.
- Evidence of the benefits of informatics is not available to specialists.
- The change management necessary to adopt informatics for knowledge management, work practices, practice administration and staff/organisational change in institutions.
- Lack of infrastructure and facilities for education, training, knowledge support functions i.e. broadband, textbooks online, libraries online, ‘last mile’ speedy access, access within operating rooms.
- Lack of funding; to support Continuing Professional Development in informatics, and also to support the development and provision of electronically based Continuing Medical Education training.
- Lack of involvement in informatics activities from the colleges. “Colleges need new staff to support informatics activities.”
- Lack of college leadership: i.e. “The College should mandate some informatics facilities (e.g. access within operating room to knowledge bases).”
- Lack of quality policies by the College regarding electronic clinical systems and use. “Self-education in informatics should be an accreditation requirement.”
- There are no evaluation and quality control measures to determine the effectiveness of electronically delivered materials.
- Engagement of specialist groups by government-sponsored programs involving informatics is inconsistent.
- Lack of availability of suitable software.
- Lack of Information Technology (IT) support.
- Inadequate hardware/infrastructure in hospitals.

- There are minimal failsafe measures to protect specialists from the additional exposures brought about by the use of informatics (risk, burden of backups, etc.)
- Lack of awareness of presently available information.
- Inconsistency in funding policies (e.g. GPs receive large incentives, specialities receive very little).
- No payment of doctors related to better data collection and use.
- No clear consistent policies on payment regime for tele-consulting – still a grey area.
- Lack of commitment to secure broadband at realistic prices by funders.
- HIC Online is not interested in specialists.
- No funding available for second opinion tele-reporting.

Enablers for EDSS Implementation in Australia

Although this report focuses on the barriers to uptake of EDSS, it is worthwhile to reflect on what enablers (or negative barriers) have been identified.

The Taskforce Report identifies the following enablers:

- End-user support and involvement: collaboration and partnership.
- Incentives for EDSS use (eg, Practice Incentives Program).
- Retaining clinicians involvement into further development.
- Sufficient funding and Government support.
- Successful marketing strategies and change management.
- Continuous training.
- Quality project planning.
- Ability to integrate an EDSS into existing information systems.
- Implementation focused on health care outcomes.
- Market capacity to adopt accreditation standards.
- Coordination of systems for future product development.
- High quality content and knowledge sources.

Enablers should not be overlooked. Powerful enablers may provide the leverage to minimise any number of barriers, possibly in unforeseen ways. Cook (2002) argues that external factors, such as legislation, are powerful enablers by limiting flexibility and leaving little choice but to adopt the legislated approach.

In Australia, the Government, through the Department of Health and Aging, is applying much pressure on parts of the health industry to adopt EDSS and other enabling information technologies. This pre-legislative pressure applied through the various colleges will convert more sceptics, albeit the *just-sceptical* ones.

In addition, it seems obvious that the sector may reach the position wherein suitable levels of insurance indemnity may only be available if accepted EDSS/IT is adopted – a sort of *hip-pocket* legislation.

As reported above, Leung *et al* (2003) report that office efficiency and better-quality care were ranked highest as potential incentives to computerize, although they do not go on to explain how higher quality of care can be achieved through computerisation.

CONCLUSIONS TO BARRIERS TO UPTAKE

Major barriers are human factor related, such as end-user attitudes, human-computer interface (HCI), technical applicability and not technology related. The CIAP study found that once the technology was in place, then it ceased to be a driving issue. This seems especially true with respect to network connectivity issues, with both high-use and low-use hospitals on both fast and dial-up network connections, reporting similar response times to CIAP access.

Cook (2002) reported that EDSS are more likely to be rejected if they present a too-unfamiliar environment for users, unless the user agreed with the reasons behind the use of EDSS aids, in which case they seemed more likely to persevere and accept the tool. This represents the classical case of resistance to change, a factor all too common in most organisational change management.

Financial barriers are an obvious culprit, reflecting the requirement for value for investment. Some reports discussed this along the lines of the return on investment and this should not be overlooked in discussions with practice management. A more marketing-style of argument may pay dividends in this scenario.

All the reports canvassed and reported above indicate that there are many barriers to the uptake of computer technology, and hence EDSS, in a clinical practice, although this appeared to reduce being a major factor once hardware was installed and appropriate training had occurred. The focus of barriers to uptake moves quickly away from technical issues to issues more related to human factors, such as resistance to change, training, concerns from patients, workflow, etc.

These human factor problems are not isolated to the health sector alone. They have been found and resolved in all sectors facing gross computerisation and like in those sectors, suitable strategies for overcoming, or at least lowering, the barriers must be implemented. Importantly, training of users (familiarisation with the technology) is identified in nearly all reports as is the appropriateness of the human-computer interface.

The ADGP report summarised usage of IT with respect to functions being performed. The summary detailed that the majority of usage is limited to one or two functions. Encouraging use in other areas might lessen barriers to uptake. This would be most easily achieved through appropriate education and training in concert with development of relevant services.

This argues for strategies anchored in basic marketing approaches, or for enforced legislative or 'hip pocket nerve' tactics and education and training.

The Value Equation

In discussions regarding marketing issues, Bob Miller³ (personal communication) expounds a simple formula for measuring the value of a proposition. This formula has been garnered over many years of work in marketing.

$$\text{Value} = \text{Quality}/(\text{Price} * \text{Time} * \text{Stress})$$

None of the variables, *Quality*, *Price*, *Time* and *Stress* may have a zero value and each represents a rating between 1 and 10 for the proposition under consideration. The higher the calculated value, the more likely the proposition will be accepted by the consumer.

It is clear that in the eHealth case, each right hand side variable represents a summation of a many dimensions. For example, *Quality* can refer to the quality of the interface and/or the quality of the

³ Managing Director of Australia Street Consulting Pty Ltd and former marketing manager for Toyota Australia
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knowledge and/or the quality of available technical support and/or the quality of training provided, etc. *Stress* could reflect the finding of required information and/or the stress of implementing the system, etc. *Time*, the time taken to get to a required piece of information and/or the time to learn the new system, etc. *Price*, may reflect a real financial cost and/or an investment in time and effort, etc.

If we take this equation as true, then any EDSS implementation should address these issues, maximise quality, whilst minimising the price, the time and the stress factor. A valuable exercise would be to identify the various factors affecting each rating value and to ascertain their importance on a clinician in removing any barrier(s) to uptake.

This may provide a valuable framework for evaluating competing EDSS technologies and infrastructure environments. The existing studies already provide glimpses into what drives clinicians and so valuable work is already available for this exercise.

CURRENT ACTIVITIES IN EDUCATION AND TRAINING

This section will provide an overview of current activities in Australia in the education and training of health professionals in the use of EDSS.

Roxanne Missingham, National Library of Australia, Training professionals in searching

In August, 2004, a discussion was held with Roxanne Missingham⁴, to discuss types of training that could be useful to professionals. Roxanne has extensive experience in the provision of training to research professionals through her work as Divisional Librarian and CSIRO. The following are transcript notes taken during this discussion about her training activities at CSIRO.

Roxanne articulated the needs of training for professionals given that there appear to be two groups: those younger professionals who have basic skills in finding information on the web; and those more mature professionals who are less *au fait* with the web.

The former wanted to know what sort of information was available in databases they had access to and required updates every few years or so. New information can be presented using a drip feed model.

The mature group wanted in depth training and personal follow up. The follow up was extremely important to maximise knowledge transfer.

In terms of searching skills, both groups required details about how to construct a search, although with the increasingly smart search engines this is becoming less of an issue as the search engine formulates the Boolean queries based on user input. Annual repetition of this training was provided for those that required it.

Training should be fairly tightly structured, very thematic, and full of examples. This way, attendees take away with them an experience of real searching rather than just generic searching.

Training should include how to select suitable and appropriate resources for searching.

People want to come together to do training. So online offerings should be seen in concert with face-to-face training rather than a replacement for it.

⁴ Assistant Director-General, Resource Sharing Division, National Library of Australia, rmissingham@nla.gov.au
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A regular information service was incorporated into professional publications so as they read those scholarly publications, they would be offered information updates at the same time.

A network of organizations aggregating information could be established along the lines of WebLaw (<http://www.weblaw.edu.au/weblaw/index.phtml>). This would provide aggregations of information sources where such aggregations are accomplished by domain professionals working in concert with information professionals, such as reference librarians.

Training needs to be focused on in situ use, rather than in-depth. Existing evidence-based training appears to focus on in-depth knowledge but training clinicians *in situ*, for *in situ* use is a different area.

The Australian Centre for Evidence Based Clinical Practice

The Australian Centre for Evidence based Clinical Practice (<http://www.acebcp.org.au>) offers regular training for clinicians in South Australia in a two-day Evidence Based Clinical Practice Workshop. These workshops are run roughly every quarter, to forty two attendees. The course is approved by the RACGP, attendees collecting a total of 26 CPD points.

The course aims to:

1. Define Evidence Based Clinical Practice (EBCP) and demonstrate awareness of current environmental influences for the development of EBCP
2. Differentiate between different sources of evidence, different levels of evidence and their relationship to different research methodologies
3. Demonstrate knowledge of basic statistical principles required for appraisal of evidence
4. Demonstrate the step by step process for conducting the critical appraisal of diagnosis and intervention studies as well as for systematic review
5. Demonstrate knowledge of different sources of evidence & demonstrate understanding of how to construct & conduct a literature search
6. Develop an understanding of how to appraise the different types of economic analysis
7. Demonstrate awareness of the important issues surrounding communicating evidence to consumers and of the resources available to help clinicians do this
8. Demonstrate an awareness of the role of clinical audit and benchmarking in EBCP

Attendees are provided with a largish manual of notes and reading material gleaned from various professional journals. As well, they are provided with a CD ROM with links to information grouped into Books; Consumer Health Information; Databases; Discipline Specific Sites; Guidelines, Guides, Hedges, Help; Journals; Statistics; Useful Other Sites; and Web Search Engines. These links enable the attendee to continue their own training on return to their office.

Each group contains a plethora of information. For example, the Guidelines group provides links for SORAHSN Web Site (EB Guidelines & CATS); SIGN Guidelines; Rehabilitation Guidelines - Welcome Page; Primary Care Clinical Practice Guidelines; Prevention Guidelines; NeLH Guidelines Finder; NeLH Care Pathways Database Gateway; NeLH - Guidelines Finder; National Guideline Clearinghouse; NICE; NHMRC - Clinical Practice Guidelines; NGC - National Guideline Clearinghouse; Mental Health clinical practice guidelines; Introducing...The Southwestern Ontario Clinical Effectiveness Network; Hospital Acquired Infection; European Clearing House on Health Systems Reform; Clinical Practice Guidelines; Clinical Practice Guidelines - Royal Children's Hospital - W; Canadian Medical Association Guidelines; CEBM - Centre for Evidence Based Medicine; CDC Prevention Guidelines; and CATBank.

The following is a copy of the program for their next workshop.



Topic
Welcome & Introduction to the ACEBCP
<p>Plenary - EBP What's all the fuss</p> <p>What is EBCP</p> <p>Why should we worry about it</p> <p>Hierarchy/levels of evidence</p>
<p>Plenary –Evidence & research design</p> <p>Different types of questions need different research designs/evidence to answer them</p> <p>Qualitative & quantitative designs</p> <p>Pros and cons of different research designs</p> <p>“Asking the right question” PICO- for the type of study</p>
<p>Plenary -Introduction to statistics for EBCP</p> <p>P-values & confidence intervals</p> <p>Odds ratios & relative risks</p> <p>Determining the power of a study</p> <p>Bias</p>
<p>Plenary -systematic review & meta-analysis</p> <p>Different types of reviews/ appraising reviews</p>
<p>Plenary –Locating the evidence</p> <p>Sources of evidence</p> <p>Databases</p> <p>The 4S model</p>
<p>Evidence Searching clinic</p> <p>Hands on Internet searching clinic in small groups- one participant to a computer</p>
<p>Plenary- Critical appraisal of therapy studies</p>

Small group work- therapy case study
Plenary- Critical appraisal of diagnostic studies
Small group work- diagnosis case study
Plenary- Clinical Audit & practice evaluation
Tools for clinical audit auditmaker
Demonstration of auditmaker –generic database development tool designed for clinical audit
Plenary-Evidence and the Consumer
Communicating evidence to consumers
Putting it into practice
Evidence based implementation
Individual goal setting

AMA Medical Taskforce on Informatics

Davey & Quinlan (2004) reports on an investigation into the use of ICT by specialist clinicians. The report provides insight into the current training requirements for the specialist clinician community.

In particular to NICS, the report recommends:

- The continuation of the AMA Medical Taskforce to facilitate collaboration between the specialist colleges and provide a focal point for strategic input from medical specialists. The taskforce also provides continuing oversight of specific initiatives, engagement activities and communications;
- The establishment of Informatics Officers in the various colleges to raise the capacity of those colleges and specialists in informatics. Larger colleges could act as mentors for smaller colleges;
- The development of common informatics training and education modules for fellowship training and Continuing Professional Development;
- An initiative to identify educational reference material suitable to all specialities;
- The establishment of consultation bureaux of informatics experts able to represent the views and issues of the specialities; and
- Undertaking a program of activities raising the awareness of informatics. Activities could include regular communication with specialists on the ground, visits to workplaces, conferences, local meetings, combined presentations and publications.

RECOMMENDATIONS

This section provides recommendations for NICS to consider in drawing up an action plan.

Branco Cesnik Actions

Branco Cesnik, a consultant to the Federal Department of Health and Ageing, in a recent discussion⁵ espoused nine activities that NICS could undertake to assist in the overcoming of the barriers to uptake and the general up-skilling of clinicians.

1. In depth software usage study, investigating the electronic decision support functionality of existing products in GP and hospital environments;
2. Maximise benefit from existing infrastructure, examples include Global health/HotHealth/Royal Children's Hospital juvenile diabetes management team. This done by a University not by NICS but facilitated by a grant from NICS;
3. Usage of on-line health record at present, done by a Uni contractor or the Cochrane Consumers Group. NICS to facilitate through a grant;
4. Align NICS projects within HealthConnect, contact Rob Wooding to facilitate this;
5. Human factor studies, QLD Uni with own floor in hospital or maybe the Distributed Systems Technology Centre (DSTC);
6. Workflow modelling, contact Vince Macauley, Ken Harvey, NZ Min of Health, NZ enigma Mark Leaning;
7. Basic primer to improve usage, create training course and material on CD ROM, online or book form ('Health Informatics for Doctor Dummies');
8. Mounting an argument for national services, rather than having state-based duplicated resources mount a single national resource, argue on cost savings.
9. Guidance for ascertaining the quality of knowledge, providing guidelines to evaluate the accuracy of knowledge within an EDSS, G-I-N (Guidelines International Network).

Project Review Teleconference, June 2004, Actions

At a project review in June 2004, the reviewers, involving staff from both NICS and CHI, suggested the following possibilities for activities that NICS could undertake to breakdown the barriers to the uptake of EDSS.

The headings refer to the headings in the section on the National Decision Support Taskforce above.

Content

- NICS could be a provider of a small set of certified evidence, eg. Cochrane, Clinical Evidence
- NICS could recommend what content would be appropriate at a national level
- Rather than be the provider of authoritative source material, NICS should work with other people who can provide authoritative sources.

⁵ Held at NICS on 17th of August, 2004. Attendees were Paul Ireland (NICS) and Dr Bob Jansen (CHI). A recoding of the workshop is available on the CHIREcs DVD.

Systems

- NICS could run information sessions for developers and broker meetings between developers and clinicians
- NICS could sponsor research to determine how EDSS integrates with clinical work so they are effective
- NICS could work with the major groups developing electronic guidelines to develop a guideline for guideline implementation

Testing

- NICS recognises that this is a major issue but is not in a position to affect this directly. However, NICS could raise this as an issue that requires solving in national and international forums.

Training

- NICS could commence a major investigation to explore what needs to be done and to influence the appropriate authorities to initiate suitable training programs

Patient Issues

- NICS could champion patient mediated interventions to change clinical behaviour, for example, interactions between patients and their health care providers. This would aim to facilitate the change of focus in health care to patient needs.

Organisational Impact

- Through its links to industry, NICS could advocate for organisational impact to maximise benefit of EDSS implementation. For example, NICS could commence a marketing campaign to organization heads and CEO's to get budget behind EDSS implementations to get better health care.

Medico-legal issues

- NICS has an advocacy role to assist in solving these complex issues. NICS should arrange and sponsor seminars to educate and inform practitioners of this complex legal area as part of general EDSS training. This will require NICS forming alliances with suitable legal organizations.

AMA Medical Taskforce on Informatics Report Actions

In light of NICS' capabilities, the following represent a set of recommendations from the AMA Medical Taskforce on Informatics.

- NICS becomes a member of the taskforce providing NICS with first-hand information about training requirements for specialists, barriers and how to remove them and a platform for facilitating change;
- Membership of this taskforce would also provide access to the proposed informatics officers in each college, again providing a direct route to market for NICS activities, and providing valuable insight into pressing problems, etc;
- NICS should become involved in the development of the proposed common training modules for the specialist community; and
- NICS should sponsor and advocate for the proposed program of activities to raise the awareness of informatics in the specialist community.

Suggested Actions

This section provides a set of recommendations from the Centre for Health Informatics after a review of recommendations given above and based on our expertise. These recommendations were discussed with National Institute of Clinical Studies at a teleconference on the 12th of October. The recommendations are categorised into short term, medium term and long term. Short Term actions can provide returns within 12 – 18 months, Medium Term within 18-24 months and Long Term more than 24 months.

The actions are not directed at any specific sub-sector of the health sector but it is recognised that the National Institute of Clinical Studies may wish to stage a roll-out from a limited targeted sub-group to the whole sector over time. The advantage of this strategy is that the activity can be honed to maximise the impact of the service. Benefits of any activity will be seen sector wide given the appropriate exposure.

Short-Term

Short-term recommendations are generally education based.

Basic primer

The development of a ‘dummies’ guide to the Internet for clinicians to guide them into the basics of Internet usage. This primer need not be built from scratch but would require the identification of a best-of-breed of primers already available but localised for health/clinician use. The primer would be available from the National Institute of Clinical Studies, through their web site, on CD/DVD and as a paper resource.

This primer would provide assistance to the novice clinician in terms of identifying high quality information sources on the Internet and basic descriptions of search engines, how they work and how they can be made to work for them.

This might complement HealthInsite, who are beginning to provide aspects of such material.

Advanced Primer in the Use of Decision Support Tools

The advanced primer provides assistance to clinicians in finding evidence online, assess the quality of online evidence, and make decision based upon what they find. The primer would explain how clinicians are likely to make mistakes and provides more details of search engine technologies and how to find suitable evidence.

This primer also advises how to be a safe and effective user of evidence tools online and a safe and effective user of decision support systems. This primer could be used as an aid in a more formal training session.

The development of this primer would assist in the translation of the extensive literature on clinician decision biases and errors into a tool of real value to clinicians at the coalface.

EDSS evaluation portal

This recommendation is for the development of a web-based information service, or portal, where clinicians can access simple guidance on how to evaluate a decision support system and where they can place results of their own evaluations and experiences in the use of decision support systems. This is an extension of the EDSS Guidelines project being delivered to DoHA, containing a first attempt at simple guidelines for the evaluation of EDSS.

This portal also disseminated knowledge of working out whether something works or not and then disseminating that evidence. In this way, it can be seen as core to the National Institute of Clinical Studies.

This information clearinghouse, or community of practice, would be the place for up-to-the-date information about EDSS and their use in clinical environments and would represent an important resource for the Australian health sector.

An important component of this clearinghouse would be a service wherein people can communicate with others and share their questions and understandings in a real-time environment. This could be cheaply implemented using existing chat-room or information-list software technology.

The seeds of this service would be in the guidelines being created for DoHA

This recommendation is short term because National Institute of Clinical Studies will get significant benefit in the short term even though this is an on-going activity well into the medium term.

Medium-Term

Evidence based medicine services (portal) involving QuickClinical technologies

Building on top of the evaluation portal, this recommendation is for the provision of value-added information services to existing search engines. Currently, users will search individual search engines, one at a time, to find available evidence. This recommendation is for a meta-search engine to sit between the user and the existing search engines and apply intelligent searching to answer real questions.

Implementing this recommendation would lead to the integration of existing information services, such as the Cochrane database and BMJ Clinical Evidence, into a single information service by enabling 'intelligent' search across such approved services through a National Institute of Clinical Studies' Meta-Search Engine.

Any such service would have to be localised to clinician groups, such as anaesthetists, surgeons, etc, who all have disparate information needs.

This recommendation anticipates a similar move in the commercial publishing world to the provision of integrated services rather than discrete information systems.

Consumer information needs

This recommendation is for the establishment of a research program into the information needs of consumers.

There is a large body of knowledge about the information needs of clinicians and health professionals, but almost none with respect to consumers.

Yet consumers are going on-line to find answers. This recommendation would provide valuable knowledge about their information needs so that appropriate information services can be established to improve consumer knowledge and awareness.

The research would also investigate the optimum mechanism for reaching consumers. This may involve digital television, digital radio, the Internet and conventional publishing channels.

Long-Term

There are no long-term recommendations beyond the advice of monitoring the situation and ensuring that the National Institute of Clinical Studies' vision and strategic direction remains topical.

This research project has indicated that we are on a journey. However, we are at such an early stage in the journey that it is difficult to predict where the journey will go in the longer term.

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APPENDIX A - METHODOLOGY

Barriers – the Taskforce Report, (National Electronic Decision Support Taskforce, 2003), was studied to elicit the previously identified barriers to uptake of EDSS. Each of these barriers was then described in terms of its nature and its potential impact and severity in a clinical setting. An analysis was then undertaken of each identified barrier with respect to the CIAP study. In this analysis, the outcomes of the CIAP study were analysed to ascertain if the target barrier was similarly identified and under what conditions. Any identified dependencies between the target barrier any external factors was also noted. A further activity involved the identification of any barriers identified by the CIAP study but not listed in the Taskforce Report. Such new barriers were detailed and any dependencies noted.

A literature survey was carried out to identify new barriers reported after the conclusion of the Taskforce analysis in 2002. This survey was conducted through the Internet and online medical journals, as well as receiving suitable material from Centre of Health Informatics researchers. The searching was accomplished using the Vivisimo search tool (<http://www.vivisimo.com>) and using the devonAgent tool supplied through Devon Technologies (<http://www.devon-technologies.com>). In each case, retrieved sets were culled for articles dated prior to 2003, sets were joined to remove duplicates, and each resultant item was explored for details of barriers or enablers.

Education & Training – the study involved discussions with Frank Quinlan, who is undertaking a more detailed study on behalf of the AMA, Roxanne Missingham from the national Library of Australia on aspects of training professionals in information searching and Ruth Sladek, from the Australian Centre for Evidence Based Clinical Practice on her existing training courses. Please note, this section of the report is not meant to be a definitive analysis but merely depicts trends in this area in Australia.

APPENDIX B – THE CLINICAL INFORMATION ACCESS PROGRAM (CIAP): CASE STUDY RESULTS

The CIAP study was a two-year evaluation of the CIAP undertaken by the Centre for Health Informatics at the University of New South Wales. The aim of the study was to improve understanding of the clinicians' information needs and assess the extent to which CIAP supports clinical decision-making processes and any improvements in patient care.

The study reported through four stages, with their lessons and recommendations summarized below

Utilisation of the Clinical Information Access Program (CIAP) in NSW: A Web Log Analysis (Westbrook & Gosling, 2001)

Executive Summary

The Clinical Information Access Program (CIAP) is a website implemented in 1997 by NSW Health to provide clinicians' access to knowledge resources at the point of care in public health care facilities and services. This report presents the results of a web log analysis to examine the utilisation of the CIAP by clinicians in New South Wales. This study is the first stage of a two-year evaluation of CIAP being undertaken by the Centre for Health Informatics at the University of NSW. The aim of the CIAP evaluation is to improve our understanding of clinicians' information needs and assess the extent to which CIAP supports clinical decision-making processes and improves patient care. The results of the study will provide guidance to the strategic development of the CIAP.

The CIAP consists of bibliographic resources (OVID resources), such as MEDLINE, and other knowledge resources (Non-OVID resources) such as clinical guidelines, MIMS and the Cochrane library. Every time a clinician uses the CIAP resources some user identification information is automatically recorded (eg organisational password), as are details of which and when resources are accessed. These data form the web logs.

The aims of the web log analysis were to calculate rates of use and to identify:

Which organisations and clinical groups use the CIAP;

When use occurs;

Where use occurs; and

What resources are used.

The results also allow some conclusions to be made regarding how CIAP is being used to support clinical care processes.

Data relating to utilisation of CIAP occurring between August 2000 and February 2001 were analysed. Monthly rates of use per 100 clinicians were calculated for individual hospitals and for Area Health Services. Comparisons were drawn between metropolitan and rural centres, and between referral and non-referral hospitals. Some proxy measures were used to examine CIAP utilisation by clinician groups (doctors, nurses and allied health staff).

Is CIAP used by clinicians in NSW?

CIAP is well utilised by groups of clinicians in NSW. Monthly rates of 232 Non-OVID hits and 49 OVID

sessions per 100 clinicians were found. The metropolitan AHS rate was significantly greater than the rural AHS rate, and referral hospitals had greater rates of use compared to non-referral hospitals.

However, it was clear that utilisation rates cannot be explained by the type or location of hospital alone. Both metropolitan and rural hospitals are found amongst the 20 most frequent CIAP user sites. This list also includes large and small hospitals, and referral and non-referral centres. Thus there is considerable variation in the rates of use of CIAP between AHSs and hospitals, both in the rates of use and in the types of resources selected for use.

Which groups use CIAP?

Medical practitioners appear to be the greatest users of CIAP. Allied health staff are probably the lowest users. This is likely to be due to both access issues and relevance of content for this latter group of health professionals. Those hospitals that had high rates of use of the Non-OVID resources, such as MIMS, were also likely to be high users of the bibliographic databases such as MEDLINE. Individual session times were longest for nursing staff which may reflect different types of searches and/or less confident search skills.

When does use occur?

Use of OVID resources was highly correlated with patient admissions, suggesting that clinicians use CIAP in response to clinical questions related to direct patient care. CIAP is used at all times of the day and night. Activity is greatest during the week between the hours of 9am and 5pm. Some variations were found in the types of resources accessed by day of the week and time of the day. This indicates that use of some resources may be linked to specific clinical tasks such as finalising patient medications prior to discharge. There was some evidence that use of specific CIAP resources is supporting clinicians at times when access to colleagues is reduced. For example, use was shown to increase at rural sites on the weekends, and guidelines were found to be used frequently during the early hours (1am-3am) of the morning.

Where does use occur?

Around 67% of CIAP use occurred at health care facilities, 23% from private residences and 10% from universities.

What resources are used?

MIMS was the most frequently used Non-OVID resource, and MEDLINE was the most popular bibliographic database. Some AHSs had a greater preference for one type of resource over another. For example, 8% of all hits in one AHS were to Micromedex, whereas for another AHS 52% of hits were for this resource. There were differences in the types of resources used in rural and metropolitan AHSs.

In 25% of sessions which used bibliographic resources users accessed the full-text journals. Nursing Standard, Advanced Journal of Nursing, The Lancet and the British Medical Journal were the most frequently accessed full-text journals. While nurses had a lower rate of use, they undertook a greater proportion of full-text searches compared to other clinicians.

Conclusions

There is evidence that CIAP is a highly used and valued resource by clinician groups in NSW. However there are no other evaluation studies of clinicians' use of online bibliographic databases against which to compare our results. Caution should also be made in making any direct comparisons between utilisation of CIAP and other websites as the utilisation measures of 'hits' and 'sessions' are not objective scientific measures. Their primary value lies in comparing rates of CIAP use between groups and over time. The log analysis showed that there is considerable variation in the rates of use among staff in health care organisations and also between professional groups. Some of the variation will be due to issues related to

access and IT infrastructure. However it is likely that organisational, professional and education factors also play a significant role in the integration of CIAP in clinical practice. The current study findings, and results of previous research on clinicians' information seeking habits, suggest that the availability of CIAP has resulted in a significant net increase in the use of information resources by both medical and nursing staff.

This project is the first in a four-stage evaluation of CIAP. The second stage of the evaluation will investigate, through the use of case studies of high and low use CIAP hospitals, questions related to why variation in CIAP use occurs, how clinicians use CIAP in the clinical setting and if, and how, clinicians believe CIAP has influenced decision-making processes and patient care.

Recommendations

The following recommendations are based upon the results of the log analysis. Many of the hypotheses generated from this project will be tested in the later stages of the CIAP evaluation. More detailed recommendations will therefore be possible following the completion of all evaluation projects.

It is recommended that NSW Health:

Reporting of utilisation statistics

1. Arrange for the automation of the calculation of monthly rates of OVID and Non- OVID utilisation as a way of monitoring CIAP utilisation over time. The current process of reporting the number of hits or sessions for health care organisations is of little value when the number of clinicians employed by the organisation is not taken into account. It is recommended that the denominator (ie number of clinical staff) be updated every 6-12 months depending upon availability of data. While there may be some fluctuations in the staff numbers these are unlikely to result in significant errors in the calculation of rates over time for particular AHSs or hospitals.
2. Ensure the calculation of rates of use, by AHSs and hospitals, of specific resources (eg specific databases or journals) as a means of determining the most useful content for CIAP. The production of these rates should be automated. It would be sufficient to generate these rates on a bi-monthly basis unless more regular feedback about use of specific content was required.
3. Develop, in conjunction with the vendor/s supplying knowledge databases, explicit quality control measures to ensure the integrity and accuracy of the log data used to calculate utilisation rates.

Variation in CIAP utilisation

4. Continue to support the further stages of the evaluation which will investigate the considerable variation in CIAP use between AHSs and individual hospitals. This research will assess the contribution of physical barriers to use (eg IT infrastructure) along with organisational and professional barriers.

CIAP training

5. Assess the extent to which health professionals are encouraged and given the opportunity to attend CIAP education sessions. The long average search times found for OVID sessions suggests that clinicians require better searching strategies. Nurses may be a particular group who would benefit from additional training in this area.
6. Consider shortening the automated OVID session log-out time from 30 minutes to 15 minutes as a strategy in providing better data regarding true OVID session times.
7. Develop strategies to target allied health staff who appear to be low users of CIAP. A strategy to target

these users should be considered in concert with the availability of CIAP content to meet their information needs. No full-text allied health journals are available via CIAP. Investigation of the value of adding such resources should be undertaken.

CIAP Content

8. Investigate options for returning The Lancet to the CIAP. The British Medical Journal and New England Journal of Medicine were also frequently used journals and steps should be taken to ensure these remain as part of the CIAP content.

9. Consideration be given to removing some of the resources with low utilisation rates. However information from the later stages of the CIAP evaluation should also be used to inform such decisions. For example it may become apparent that certain professional groups are active users of some resources which have generally low rates of use.

Pilot Study of Methods to Assess the Impact of the CIAP on Clinical Practice and its Economic Value (Gosling & Westbrook, 2002)

Executive Summary

This study is the second stage of a two-year evaluation of Clinical Information Access Program (CIAP) being undertaken by the Centre for Health Informatics at the University of NSW. In 1997 NSW Health developed the Clinical Information Access Program (CIAP) www.ciap.health.gov.au which provides health professionals with online access to a wide range of bibliographic and other clinical information resources at the point-of-care. This report presents the results of a multi-method study that examined factors influencing variations in the utilization of CIAP found in the first stage of the evaluation, the web log analysis.

The aim of the CIAP evaluation is to improve our understanding of clinicians' information needs and assess the extent to which CIAP supports clinical decision-making processes and improves patient care. The results of the study will provide guidance to the strategic development of the CIAP.

This second stage of the evaluation used the rates of CIAP use calculated in the web log analysis to identify low and high use hospitals from rural and metropolitan areas that could be studied using a case study approach. The aim of the case studies was to answer questions about reasons for the wide variation in CIAP use. This included differences between professional groups' use of CIAP, differences between high and low use hospitals and differences between rural and metropolitan hospitals. Factors influencing use, reasons for use and the perceived impact on patient care were examined. Organisational, cultural, team and technical factors were considered.

Three studies were carried out at the three case study hospitals (one high use metropolitan hospital, one high use rural hospital and one low use rural hospital).

1. *Qualitative study*: Focus groups and interviews were conducted with 64 staff. Reasons for using CIAP and factors influencing variation in use were explored.

2. *CIAP survey*: Two-hundred and forty-seven clinicians completed a survey about their use of CIAP.

3. *Team survey*: Twenty-two teams (n=200) completed an instrument measuring team climate (Team Climate Inventory, TCI).

What are the main reasons clinicians use CIAP?

Doctors report using CIAP for patient care, research and professional development (personal continuing education and education of others). Nurses report using CIAP for professional development, policy and

guideline development and to a lesser extent for patient care. Allied health staff report using CIAP for service development, treatment, research and to some extent for professional development.

What factors influence variation in use between professional groups?

Focus group results found that factors such as the extent to which the professional and organisational cultures encouraged information-seeking and legitimised it as part of the professional role of the staff member was a major influence on use of CIAP. As such, doctors were the most at ease with using CIAP as part of their everyday work. Nurses and allied health staff reported difficulties with information retrieval and effective database searching which inhibited their use. Allied health staff did not believe that the information relevant to their needs was always found within the CIAP databases. Nurses had the lowest awareness of CIAP and were the group least likely to use CIAP.

What factors influence variation in use between hospitals?

Accessibility was a factor for some staff who did not have PCs in their workplace. Many staff used CIAP at home. Although the slow speed of PCs was mentioned as a hindrance in both rural hospitals, objective measurement demonstrated that this was not a primary barrier to use. Likewise, external factors such as lack of time and staff shortages did not appear to be a barrier if the clinicians were highly motivated to seek information. Lack of organisational support for the use of CIAP, and for information-seeking, were barriers to use for nursing and allied health staff in the low use rural hospital. Having clinician ‘champions’ who supported and encouraged use of CIAP was a positive factor in rural hospitals.

Does team climate influence CIAP use?

The clinical teamwork environment, measured using the Team Climate Inventory (TCI) influenced clinicians’ use of online evidence. Teams with high team climate scores reported greater use of evidence and significantly more experiences of improvements in patient care as a result, compared to teams with low scores. Smaller teams had higher TCI scores than larger teams. Nursing teams had the lowest TCI scores compared to other multi- and single disciplinary clinical teams.

Conclusion

This study found that cultural, organisational and team factors were important in explaining variations in CIAP use between professional groups and between high and low use hospitals. Technical barriers were most problematic in the rural hospitals but CIAP was still used despite these barriers. Positive promotion of CIAP, and support and encouragement to use it were major factors influencing use. Nurses and allied health staff reported needing most support in the effective retrieval of information. CIAP was used by all three professional groups. Doctors were the highest users and most likely to use CIAP for patient care. Nurses’ awareness of CIAP was the lowest of the three groups.

The next stage of the evaluation will investigate CIAP use across hospitals in NSW, using a statewide survey. High and low use hospitals randomly selected from all Area Health Services will be surveyed. Questions regarding awareness of CIAP, reasons for use, technical skills and factors influencing use will be included. This survey will allow some of the hypotheses raised in this report to be further investigated.

Recommendations

The following recommendations are based upon the results of this study. More detailed recommendations will be made when results from the state-wide survey and the final stage of the evaluation (use of CIAP for clinical decision-making and patient care) have been completed.

It is recommended that NSW Health:

1. Use the CIAP representative system to continue the promotion of CIAP to clinical staff. Senior clinicians will be most useful in the general promotion of CIAP use to their own professional group. Support from

senior management is also essential to ensure access at work and PCs that can support timely use of CIAP. It is recommended that for each organisation there is a least one CIAP representative for each professional group (medical, nursing and allied health).

2. Encourage all hospitals and Area Health Services to incorporate orientation to CIAP in their induction programs for new staff.

3. Forward these results to the CIAP Librarian User Group (CLUG) to determine how librarians can support health staff training in information retrieval skills. Nursing and allied health staff may need multiple sessions to increase their competency and confidence levels.

4. Consider training staff in the retrieval, appraisal and application of evidence to their clinical work. This will assist in placing the use of CIAP in a context of adopting an evidence-based approach to patient care among all professional groups.

5. Adopt a specific strategy to increase nursing staff awareness and use of CIAP as they were the least well informed about CIAP's existence. (The NSW statewide survey will provide data to further test this hypothesis and may identify specific groups (e.g. junior level nurses) to be initially targeted).

6. Consider further research into the influence of team functioning on effective use of evidence in patient care. This should include the development of strategies to enhance existing team functioning, particularly among nursing teams. Evidence from the UK suggests that such an approach may have several other advantageous outcomes for patient care and staff satisfaction.

7. Review the addition of other allied health resources in consultation with allied health staff such as key full text journals and Australian content.

The Influence of Professional and Organisational Factors on Health Professionals' Use of Online Evidence. An Evaluation of the Clinical Information Access Program (Gosling & Westbrook, 2002b)

Summary of Results

Sixty three percent of respondents had heard of the CIAP. Of those, 75% reported using it. Medical staff report being the highest and most frequent users. Most staff used the CIAP less than once a week. Access at the point of care was around 57%, but more staff in high use hospitals reported having access than staff in low use hospitals.

A minority of staff reported receiving training in the use of the CIAP, with allied health staff reporting the highest level. However, training impacted on ease of searching and skills in using the CIAP for nurses only. Usability of the CIAP was high, with only 13% of respondents reporting that the CIAP was difficult to use.

Reasons for use were varied. Although most staff reported using the CIAP 'to fill a knowledge gap', allied health staff were more likely to report use for improving patient care, and doctors and pharmacists had the highest rates of direct experience of CIAP use improving patient outcomes. MEDLINE and CINAHL were the most frequently used databases. Full-text journal use was similar to that found in the web log analysis.

Computer use was high across all professional groups, ranging from 96% of doctors to 85% of nurses. Fifty-four percent of respondents rated their computer skills as good or better. The most frequent reasons for not using CIAP were lack of training and time limitations. These were reported in similar proportions across professional groups and high and low use hospitals.

Pilot Study of Methods to Assess the Impact of the CIAP on Clinical Practice and its Economic Value (Gosling & Westbrook, 2003)

This phase of the CIAP study focussed on mechanisms for testing methods for assessing the impact of CIAP on clinical practice, patient outcomes and cost.

Does CIAP have an impact on clinical practice?

Using the clinical incident technique, clinicians reported specific examples of CIAP use and the contribution of information gained to clinical practice and patient outcomes. Clinicians reported improvements in patients' physical and mental health, quality of life and their ability to participate more effectively in health care decision making processes because they were better informed about their health. Clinical Nurse Consultants particularly used CIAP to assist in the development and revision of policies, procedures and guidelines. One quarter of incidents contributed to measurable improvements in patient outcomes (eg. Life saving intervention, prevention of an unnecessary procedure or medication). CIAP use contributed to increasing clinicians' confidence in their decisions and information obtained was often distributed to other staff enabling the benefits to be disseminated to a wider population.

The remainder of the report goes on to describe specifics related to the two assessment methods chosen for study, *Clinical Incident Tracking* and *Journey Mapping*, and thus has no further impact on the work of the current study.

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