Identifying barriers to implementing a cardiovascular computerised decision support system (CDSS): a Delphi survey

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ABSTRACT

Purpose This paper reports an evaluation of stakeholders’ perspectives and recommendations for the dissemination of a cardiovascular computerised decision support system (CDSS) program.

Methods A literature review of dissemination models for health information and decision support aids was undertaken to develop a semi-structured interview protocol outlining a range of dissemination models for distribution. A cross section of eight health professionals and three corporate managers were interviewed to provide as broad a view as possible of eight dissemination models. Data were collected via two questionnaires incorporating the Delphi technique. Perspectives from the corporate managers were collected by telephone interview.

Results Financial incentive was the most highly rated dissemination method, followed by joint promotion with a professional body and undergraduate medical education. The lowest average rating was for dividing the program into separate components. Participants provided five other suggestions for dissemination. Suggestions for further exploration include the development of a multi-professional model comprising two or more approaches that is piloted and evaluated.

Conclusion Our results provide beneficial information on the potential dissemination of computer decision support systems to health professionals whose uptake of CDSS has not previously been explored. Whether use of a shared decision aid impacts on the decisions made by health professionals working in a team is, however, less evident.

Keywords: cardiovascular, computerised decision making, diffusion of innovation

Introduction

In a technological age, the use of electronic means to assist health professionals in their work appears to have achieved limited adoption. In the USA, for example, it is reported that during 2005, approximately 23.9% of physicians used electronic health records (EHRs) in the ambulatory setting, while only 5% of hospitals used computerised physician order entry systems. Likewise, in the UK, which has an extensive computerised primary healthcare sector, the use of computerised decision support systems (CDSS) is not commonplace.

Investigating primary care physicians’ use of electronic patient records in Norway, Christensen et al concluded that their full potential had not been reached and that problems of integration and functionality needed to be addressed to achieve this. Computerised decision support systems are one type of electronic interface designed to assist clinicians in decision making and risk management and to facilitate shared decision making between health professional and patient.

Achieving maximum adoption and usage by primary care professionals requires a comprehensive understanding of which professionals find it attractive and why.

This paper – a report of research that obtained health professionals’ and industry representatives’ opinions on the most effective approach or approaches to the dissemination of an electronic decision support
system – represents one of the few published investigations into professionals’ perspectives of what encourages them to use CDSS.

Background

Introduced in 1998, electronic decision support systems have been defined as ‘access to knowledge stored electronically to aid patients, carers, and service providers in making decisions on health care’. Computer-based information systems may be used to integrate clinical and patient information and provide support for decision making in patient care. Risk assessment statistical models are being used in medical decision making, quality improvement tools, and as aids to patient counselling.

Applications have the potential to assist clinicians and patients to make specific and conscious choices regarding health care and intervention options. They have the potential to act as a record system, aid diagnosis, provide alerts, and to calculate risk or mortality. Importantly, in primary care, decision support tools can help providers put the focus of care on prevention. An additional advantage is that decision support systems can be shared by all members of the primary care team, with each recording their management of the patient. Thus, it is possible to get an integrated view across provider categories of those problems of one patient that belong together. This shared problem-oriented patient record provides an important feature for the primary care team.

Cardiovascular disease (CVD) is a major health problem worldwide and one of the main causes of morbidity and mortality. Treating complications from this disease costs healthcare systems billions of dollars each year. However, early detection provides opportunities to reduce this problem and CVD can often be prevented if persons at risk are identified and interventions begun early. Cardiovascular disease is complex, requiring risk assessment, management of symptoms and management of the changing physiological state due to interventions. Use of information technologies, including clinical decision support systems, can help address this complexity.

Utilising a comprehensive approach, computerised decision support software may be used to support a primary care consultation in the following ways:

- by providing easy access to appropriate and accurate information, including educational material
- by assisting in diagnosing or alerting the practitioner and patient to a probable outcome
- by engaging and involving patients in decision making regarding their own health care.

A range of clinical decision tools to assist providers to perform cardiovascular assessment have been developed, validated, and even adapted to hand-held computers to increase their portability. Some cardiovascular decision tools, such as those developed by the New Zealand National Prescribing Service, American College of Physicians (ACP) and American College of Cardiology/American Heart Association (ACC/AHA), are algorithmic approaches that make direct recommendations about whether to pursue cardiac testing. Other decision tools provide a risk score or index, which the user must interpret and translate into appropriate recommendations.

Within the literature there is a dominance of papers discussing EHRs. These frequently reported that the uptake of such tools was slow, suggesting that greater support for practices, particularly smaller ones, would enhance the adoption of electronic tools. Giebert reasons that the explosion of clinical data that are available make it difficult for clinicians to find answers to clinical questions. Although resistance to the implementation of technology-assisted care is not uncommon electronic healthcare records and other electronic means are increasingly used to assist clinicians in this process.

Advantages for providers

As discussed, decision support tools assist providers to focus their attention on prevention. In complex primary care settings where there are low adoption rates of electronic tools to support the care of patients with chronic conditions, successful implementation may require a set of interrelated system and technology factors.

The type and depth of clinical information available to clinicians is expanding rapidly. To be most useful, information should be available at the time and place it is needed and be specific to the task at hand. In an approach based on continuous quality improvement and evidence-based health care, useful information must be relevant to both the processes and outcomes of care. Clinical practice guidelines have become increasingly popular for improving the quality of health care and are updated frequently. To be most useful they must be readily at hand. The field of medical informatics can bring cogent information to the point where decisions are being made to augment quality improvement activities in general, and practice guidelines in particular.

Implementation of innovative electronic technology will assist in providing better patient care by allowing for and providing more accurate, easily accessible and available patient information.

Advantages for patients

Chronic disease-related decisions are challenging, requiring patients to evaluate associated medical and psychological outcomes within the context of their
Identifying barriers to implementing a cardiovascular CDSS: a Delphi survey

Barriers to adoption

Leslie et al reported that identified barriers to implementation in primary care included lower computer literacy among general practitioners (GPs), a lack of complexity within CDSS in addressing non-medical needs of patients and a reluctance among medical staff to consult guidelines during patient consultations. Improving computer skills, integrating CDSS into referral pathways and requests for investigations may be ways of enhancing use of this type of technology.18

Another study found that GPs believed that important interactions might be missed because of distraction resulting from too many alerts, which also intruded on workflow.19 If interaction alerts were severity graded and only significant ones appeared this could improve adoption of CDSS systems.19

Several practical barriers to the use of computerised support systems in primary care consultations were identified. These included limitations of practitioners’ information technology skills, problems for GPs in understanding the risk output of systems and GP concerns about communicating risk sufficiently well to patients.20 Concerns over the potential impact of time using a system in a consultation was also identified as a barrier.8

A probabilistic decision support program

‘Probabilistic’ CDSS systems compare patient data to recorded population data to predict or diagnose medical events. One example of this type of system is cardiovascular risk calculators, which are becoming a more widely accepted part of many primary care consultations.7 The program on which this evaluation reports was a newly-developed probabilistic CDSS program that aimed to enhance hypertension management in medical settings. Clinicians conducting health assessments on patients enter data including age, gender, blood pressure, cholesterol level, and risk factors including diabetes and smoking history into the program, which then calculates the patient’s relative risk of a cardiovascular event. This information may be easily stored in and retrieved from computerised medical record databases such as Medical Director. The program also contained educational materials for patients to access either in print form or as a video, which was designed to encourage the sharing of management and responsibility between patient and doctor, and to focus on health promotion rather than only on illness management.8

Following development and initial testing, a recent study investigated GP and consumer views on the acceptability and usability of the program.8 Following use in general practice consultations, consumer feedback indicated that the program was generally seen as acceptable, practical, and serviceable. Consumers also considered it as a positive way to interact with the GP, and the possibility of being able to access the educational materials was well regarded. On the other hand, GPs were somewhat wary of the increased demands on their time made by using the program and were concerned about possible disruption to patient consultations. However, consumers indicated that they did not oppose its use in their general practice consultations.8

Study aim

The reported study aimed to obtain consensus from health professionals and industry representatives on the most effective approach or approaches to utilise to disseminate the program. Ethics approval to conduct the study was obtained from the University of Adelaide Human Research Ethics Committee, project no. H-023–2005.

Method

A purposeful cross-sample of clinicians and professionals was selected to represent specialist practices; primary care, general practitioners and practice nurses, community pharmacists, and industry. Being a qualitative study, a small sample that could provide a full and sophisticated understanding from a cross section of health professionals was ideal. Eight South Australian health professionals provided a range of professional
perspectives, with two GPs, two cardiologists, two nurses, one pharmacist, and one primary healthcare co-ordinator taking part.

As Table 1 shows, the majority of participants were male \((n = 5)\), aged 41–50 years \((n = 6)\), and worked full time \((n = 5)\). The average length of time professionals had worked in their current profession was 10.5 years (range 1–22 years), and most considered themselves to be in the middle stages of their career \((n = 4)\). Just one \((n = 1)\) participant worked in a country area.

To gain an industry perspective on dissemination, three managers responsible for product development, corporate development, and business affairs within the study funding body participated in phone interviews.

Both quantitative and qualitative methods of data collection were used in this study which consisted of two stages. Stage one developed the background information and tools for the project. A review of the literature revealed previous research studies and reports. A literature search including the mesh terms ‘decision making’, ‘computer-assisted’ and ‘diffusion of innovation’ revealed 62 articles, none of which described a study with a similar aim to the reported one. The dissemination models described in the study were sourced from the final report of the Integrated Care Program (ICP), a joint venture between the Pharmaceutical Alliance (Eli Lilly, GlaxoSmithKline and Merck Sharp and Dohme), the Australian Government Department of Health and Ageing, and Central Bayside Division of General Practice.21 The results of the literature review helped to develop the questions for the semi-structured interview protocol presenting a variety of dissemination models. In stage two, data were collected through a survey and telephone interviews of stakeholders’ perspectives and recommendations on the dissemination of computer decision support software. Data identified the type of decision support aids used and how these were accessed or obtained.

### Table 1: Demographic and occupational characteristics of participating healthcare professionals

<table>
<thead>
<tr>
<th>Profession</th>
<th>Gender</th>
<th>Age</th>
<th>Work status</th>
<th>Career stage</th>
<th>Years in profession</th>
<th>Work location</th>
</tr>
</thead>
<tbody>
<tr>
<td>GP</td>
<td>Male</td>
<td>51–60</td>
<td>Full time</td>
<td>Mid</td>
<td>22</td>
<td>Suburbs</td>
</tr>
<tr>
<td>GP</td>
<td>Male</td>
<td>41–50</td>
<td>Full time</td>
<td>Mid</td>
<td>15</td>
<td>Suburbs</td>
</tr>
<tr>
<td>Cardiologist</td>
<td>Male</td>
<td>41–50</td>
<td>Part time</td>
<td>Mid</td>
<td>11</td>
<td>Capital city</td>
</tr>
<tr>
<td>Cardiologist</td>
<td>Male</td>
<td>41–50</td>
<td>Full time</td>
<td>Mid</td>
<td>15</td>
<td>Metro. centre</td>
</tr>
<tr>
<td>Nurse</td>
<td>Female</td>
<td>41–50</td>
<td>Part time</td>
<td>Mid</td>
<td>8</td>
<td>Country</td>
</tr>
<tr>
<td>Nurse</td>
<td>Female</td>
<td>41–50</td>
<td>Part time</td>
<td>Later</td>
<td>10</td>
<td>Capital city</td>
</tr>
<tr>
<td>Pharmacist</td>
<td>Male</td>
<td>21–30</td>
<td>Full time</td>
<td>Early</td>
<td>2</td>
<td>Capital city</td>
</tr>
<tr>
<td>PHC coordinator</td>
<td>Female</td>
<td>41–50</td>
<td>Full time</td>
<td>Mid</td>
<td>1</td>
<td>Capital city</td>
</tr>
</tbody>
</table>

### The Delphi method

The Delphi technique (or method) was designed as a way to gather a reliable consensus from a group of ‘experts’ on a certain topic, without them needing to actually having to be in one place at the same time.22 This technique has the benefit of avoiding potential group biases. Delphi aims to gather a reliable consensus from a group through a cyclical process first involving the completion of a postal questionnaire by a number of ‘experts’ on the topic being investigated. The completed questionnaires are then collated, and controlled feedback is provided to the experts before they re-complete the original questionnaire. This ‘questionnaire–feedback’ process is repeated until the best possible consensus has been obtained from the group.23 While up to six rounds of questionnaires have been employed, utilising two or three rounds is more common in research.23

#### Round I questionnaire

The first round questionnaire initially asked participants for a selection of demographic and occupation-related data. Next, participants were asked to read the following:

Empower is an electronic cardiovascular assessment and management tool. It allows clinicians conducting health assessments on patients to enter data including blood pressure, cholesterol level, and risk factors including diabetes and smoking history into an algorithm, which then
Identifying barriers to implementing a cardiovascular CDSS: a Delphi survey

Calculates the patient's relative risk of a cardiovascular event. This data may also be stored in electronic medical records and retrieved when desired. In addition, Empower contains patient education material that can be printed or viewed as a video.

After the description, respondents were asked to indicate on a Likert scale from 1 (extremely likely) to 10 (extremely unlikely) how likely they would be to use this program while caring for patients who had either existing cardiac problems, or who presented with risk factors for cardiac problems, and why? Space was provided for a qualitative response to the question.

The main section of the questionnaire asked for respondents' opinions regarding a number of potential dissemination models for the program. Table 2 displays the dissemination models investigated, which were sourced from the final report of the ICP. Respondents were asked to read the description provided about each model (as per Table 2), and indicate on a Likert scale ranging from 1 (extremely ineffective) to 10 (extremely effective) how effective you think this method would be in disseminating the Empower program to health professionals, and describe why you chose this answer. Follow-up questions were asked for several of the dissemination models.

The final items in the questionnaire asked respondents to choose which two dissemination models, if begun immediately, would work best to (a) maximise the short-term distribution of Empower (in the first 12–18 months of its release)? (b) maximise the longer-term distribution of Empower (from the second year of release onward)? and (c) which two dissemination methods would be the best overall to use in disseminating Empower?. Respondents were also asked to describe any other possible effective dissemination methods they could suggest.

Round II questionnaire

Responses provided by participants in the first round were collated and, using SPSS 13.0 (SPSS Inc 2004), analysed for basic frequencies and descriptives. In the round two questionnaire, respondents were provided with the same descriptions of the program and dissemination methods (Table 1) as in the first round questionnaire, but were also fed back their own answer for each question, plus the answer most commonly chosen by the participants. Respondents were asked to consider the feedback and re-answer the questions, 'How likely is it that you would use Empower when caring for patients with either existing cardiovascular problems or risk factors for cardiovascular problems?' and for each dissemination method, 'How effective do you now think this model would be in disseminating the Empower program to health practitioners?'. Each question was answered on the same 10-point Likert scale used in the first round questionnaire.

Phone interviews

Three industry partner representatives from the areas of product development, corporate development, and business affairs were also interviewed, to gather a corporate view on dissemination methods. Interviewees were asked in phone interviews about how they might expect the program to impact on their job, and how it could contribute to their particular business responsibilities or activities.

Procedure

The Delphi technique requires that participants be ‘experts’ in the topic being examined. Based on this premise, seven South Australian healthcare professionals who were known to the lead researcher were personally approached to take part in the study. One other participant in this study was provided with the round one questionnaire by a third party. Participants were offered AU$50 remuneration for their time.

After verbally agreeing to be involved, the participants were provided with the first round questionnaire. They were asked to answer and return the questionnaire as soon as possible by fax, email, or post. Reminder phone calls were made and/or emails were sent every fortnight until all questionnaires had been returned. The second round of questionnaires was provided to participants two to three weeks after all of the first round questionnaires had been returned.

All seven healthcare professionals who had been invited to participate completed and returned both the first and second round questionnaires. The participant who was given the first questionnaire by a third party completed only the round one questionnaire, as she was unable to be contacted to take part in the second round. Therefore, eight participants completed the first round, and seven completed the second. Three staff members from the study funding body participated in a short, semi-structured telephone interview at a time convenient to them.

Results

Stability in the respondents' opinions and level of consensus was measured through standard deviation. The lower the level of standard deviation, the higher the level of agreement between the group of experts, while less change in the mean ratings, scores, or rankings...
<table>
<thead>
<tr>
<th>Dissemination model</th>
<th>Description (relating to use of model with Empower)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuing medical professional education (CPE)</td>
<td>The continuing medical professional education program allows medical practitioners, including doctors and nurses, to gain points for completing training programs that assist in maintaining and updating their knowledge, to provide improved care to patients. By including information and training for the use of Empower as part of a CPE program, practitioners would gain points towards their accreditation.</td>
</tr>
<tr>
<td>Integration into undergraduate medical education</td>
<td>Studies have shown that younger doctors are more confident in the use of computer decision support software such as Empower. Training for a variety of these types of software, including Empower, could be integrated into undergraduate medical education, providing medical students and nurses with a knowledge and understanding of electronic tools that are often used in the medical field.</td>
</tr>
<tr>
<td>Integration into postgraduate medical training</td>
<td>Training in the use of computer decision support software such as Empower could also be incorporated into medical training programs for trainee GPs, specialists, and nurses at a postgraduate level. This model would be similar to the previous one, except that the focus would be on postgraduate, rather than undergraduate, training.</td>
</tr>
<tr>
<td>Practice nurses</td>
<td>With many practices employing practice nurses, practice nurses could be made responsible for the management of CDSS programs such as Empower. GPs and specialists would be relieved of the time-consuming task of entering the initial patient data in the system, leaving them free to use CDSS programs including Empower as a support tool in consultations.</td>
</tr>
<tr>
<td>Targeting younger, computer-literate medical practitioners</td>
<td>Research has shown that younger medical practitioners are often more computer literate and more confident in using CDSS programs such as Empower. Targeting younger medical practitioners in the dissemination of Empower may ensure that the program is most widely distributed to users who are more likely to use it.</td>
</tr>
<tr>
<td>Financial incentives</td>
<td>In this model of dissemination, users would be provided with a one-off payment which would be linked to a formal agreement for the user to install and use Empower in their practice. The practitioner would be paid their consultancy fee for participation in Empower training, and a separate payment would be made once evidence is received that Empower is being used, and that a target number of uses has been met.</td>
</tr>
<tr>
<td>CDSS as separate components</td>
<td>Empower consists of three main components: a disease management tool involving electronic case notes for storing patient information, an algorithm for calculating cardiovascular risk, and health education information including a video on healthy eating and printed material on salt intake. Empower could be developed as separate programs, which might incorporate one or more of these components. Furthermore, if the software was split into two or three applications to install, a doctor and practice nurse within a practice could each separately manage the various components of the Empower program.</td>
</tr>
<tr>
<td>Joint promotion with peak body</td>
<td>The final possible method for the dissemination of Empower would involve a joint promotion of the program as a valuable decision-making tool by a leading medical or professional body, such as the National Heart Foundation. This method would allow for quality control by having the endorsing body provide the clinical guidelines and education material included in the software, and would allow users to know that the peak body had endorsed the information and materials within the program.</td>
</tr>
</tbody>
</table>
between rounds indicated greater stability of opinion from the experts.23,24

First and second round analyses of experts’ ratings on how likely they would be to use the program while caring for patients showed both a closer consensus (SD = 2.41 vs. 2.14) and a greater likelihood of them utilising the program (M = 6.36 vs 5.86) in the second round of questionnaires than the first round (Table 3). The second round consensus also indicates that the average participating medical professional would be somewhat likely (more likely than not) to use CDSS with patients (M = 6.36; SD = 2.14).

Table 4 displays medical professionals’ ratings of each of the investigated potential dissemination methods in both Delphi rounds. Rankings for most methods remained relatively stable across both rounds, and a closer consensus on most dissemination methods was found in the second round (excluding ‘targeting younger practitioners’ and ‘continuing medical education’).

The second round consensus showed that overall, using financial incentives was the most highly rated dissemination method (M = 8.33; SD = 1.03), followed closely by joint promotion with a professional body (M = 7.57; SD = 1.90) and dissemination through undergraduate medical education (M = 6.92; SD = 1.36). The lowest average rating was given to separating the program into separate components for different practitioners’ use (M = 4.80; SD = 2.49).

As collected in the first round questionnaire, medical professionals’ ratings of which methods they believed would be most effective for the short term, long term, and overall dissemination are displayed in Figure 1. The two most popular short-term methods

| Table 3 | Participants’ round I and II ratings (1 = extremely unlikely, 10 = extremely likely) of how likely they would be to use the Empower program when caring for patients |
| --- | --- | --- | --- | --- | --- |
| | Round I | Round II | | | |
| | Mean | SD | Range | Mean | SD | Range |
| Likelihood of using Empower program in own clinical work | 5.86 | 2.41 | 3–8 | 6.36 | 2.14 | 3–9 |

| Table 4 | Participants’ average ratings (1 = extremely unlikely, 10 = extremely likely) given to each dissemination method in rounds I and II |
| --- | --- | --- | --- | --- | --- | --- |
| | Round I | Round II | Round II ranking |
| N | Mean | SD | N | Mean | SD | |
| Financial incentives | 7 | 8.00 | 1.12 | 7 | 8.33 | 1.03 | 1st |
| Joint promotion with peak body | 8 | 7.44 | 2.20 | 7 | 7.57 | 1.90 | 2nd |
| Undergraduate medical education | 7 | 7.29 | 1.50 | 7 | 6.92 | 1.36 | 3rd |
| Targeting younger practitioners | 8 | 6.81 | 1.46 | 7 | 6.79 | 1.52 | 4th |
| Postgraduate medical training | 8 | 6.88 | 1.25 | 7 | 6.43 | 0.79 | 5th |
| Practice nurses | 8 | 6.63 | 1.51 | 7 | 6.36 | 1.49 | 6th |
| Continuing medical education | 8 | 6.13 | 1.96 | 7 | 6.14 | 2.34 | 7th |
| CDSS as separate components | 6 | 5.50 | 2.81 | 7 | 4.80 | 2.49 | 8th |
were financial incentives and promotion with a professional body, while in the longer term promotion through undergraduate medical education and utilising practice nurses were seen as being potentially more productive. Consistently, the most popular ‘overall’ dissemination methods were two of the popular long-and short-term ones: utilising practice nurses and financial incentives.

Interviews with industry partner representatives found an unexpected view from a pharmaceutical company about its potential role and its perception of responsibility in the healthcare sector. It was obvious to the interviewer that the company prided itself on its wish to contribute to improving health outcomes and not only to be seen as a business enterprise.

Need to consider how to enhance the company’s standing in the eyes of stakeholders, enhance quality use of medicines, and differentiate ourselves from other competitors. The goal isn’t necessarily to sell more products, it’s to be held in good stead with the government and to be recognised by them that we are trying to improve health outcomes and not only to be seen as a business enterprise.

Discussion

Evaluation of a number of potential dissemination models for CDSS was conducted to gain a broad perspective from ‘expert’ South Australian health professionals. General practitioners and practice nurses were in favour of a program that was inexpensive, fast, and able to keep data as a permanent record, ideally within the main software program run on practice computers. Additional factors were whether it helped with patient motivation, as well as clinical decision making and whether it incorporated ‘check box’ type data entry rather than long data entry.

A less favourable view from a pharmacist and cardiologist was that good and established calculators already existed and another would not be attractive just because it was electronic. Difficulties incorporating risk calculators into a patient consultation in the past had been experienced and in addition the likelihood of using or accessing computers during consultations may be limited.

Medical professionals’ individual ratings of how likely they felt they would be to use the Empower program in their clinical work, and their reasons for the rating they chose, are found in Table 4. Those who were more positive about using the program emphasised issues such the need for cheap, easy-to-use programs, and being able to keep permanent records of results. Medical professionals who felt they were less likely to use CDSS gave reasons including not usually using patient education materials in consultations, limited access to computers when with patients, and the existence of other reliable cardiovascular risk calculators.

Financial incentives, joint promotion with a professional body, and undergraduate medical education were highly ranked; although it could not be determined that one professional group preferred one over the other.

Most professionals’ comments toward incorporating CDSS in undergraduate medical education were generally positive, noting that the skills would be formed early and would thus be sustained for longer (‘hard-wired’), that electronic tools were becoming more readily used in medical settings, and that it would be more likely to become ‘usual practice’ for the students. On the other hand, one medical professional felt that this method would be ineffective because medical
students already have the skills needed to use CDSS programs in clinical consultations without extra training.

Negative thoughts on financial incentives as a method included that GPs might be more wary of being involved if there were financial incentives as they might expect more up-front work, that clinicians are already inundated with paid surveys, and that ethically medical professionals shouldn’t be paid anything. More positive perspectives included the opinions that the project would have a better chance of succeeding if medical professionals were reimbursed for their time, and that it’s ‘all about the buck’ and that ‘time is money’.

Medical professionals’ ratings and opinions of promotion in conjunction with a professional body (i.e. the National Heart Foundation) were generally positive. The ‘for’ comments included medical professionals liking to know that these types of tools are being driven by the right reasons and not commercial interests, that medical professionals already base their care on National Heart Foundation guidelines and this would validate the program, that the established reputation of the professional body would be beneficial, and that this would reassure practitioners that the program was evidence-based and supported/validated by credible affiliations. More cautious opinions on professional body promotion were that it could be quite time consuming, that on its own this method would not be enough for dissemination, and that the program might become known as ‘belonging’ to the professional body (which could be either a benefit or hindrance).

As financial strategies may be short term, but collaboration with a professional body and a strategy that targets upcoming practitioners may be medium to long term, it is suggested that different approaches be explored. Due to the divergence of views in the findings, it is clear that a model comprised of two or more approaches would be beneficial and that the target population should be multi-professional.

Methodological issues/further research

As only one expert participant in the study worked in a country area, it was not possible to hypothesise as to whether there could be a different need for or application of the program in rural areas, where nurses and health workers commonly provide primary care services. Practice nurses are becoming increasingly more prevalent in general practice, with their roles evolving quickly. However, it was evident from their responses that some participants, not having had the experience of working with a practice nurse, found questions about how nurses could be involved in the dissemination of CDSS both confusing and thought provoking.

It would be interesting to revisit this dissemination model in 6–12 months as practice nurse roles continue to evolve.

Future research may wish to explore the feasibility of non-financial incentive models, as well as teaching-only and service delivery-only versions of CDSS programs, which could also be linked to an incentive model. General practice training programs might be targeted as a source to help develop the program as a teaching tool and target new doctors. The potential value for young practitioners developing assessment expertise was first identified during alpha testing, which investigated the acceptability and usability of the software. Likewise the consumers, who were not involved in this study but who were involved in the previous testing phase, were eager to be able to access the educational materials at home.

From these findings it is recommended that a multi-professional dissemination model be developed, piloted, and evaluated.

Conclusion

This study sought to explore health professionals’ opinions of the most effective ways to disseminate a computer decision support software program for the assessment and management of cardiovascular disease. A literature review of dissemination models for health information and decision support aids was undertaken and a semi-structured interview protocol outlining a range of dissemination models for distribution developed. A cross section of eight health professionals and three corporate managers were interviewed to provide as broad a view as possible of eight dissemination models. Data from the health professionals were collected via two questionnaires incorporating the Delphi technique. Perspectives from the corporate managers were collected by telephone interview.

A financial incentive was the most highly rated dissemination method, followed by joint promotion with a professional body, and undergraduate medical education. The lowest average rating was for dividing the CDSS program into separate components. Participants suggested five other recommendations for dissemination. Suggestions for further exploration includes the development of a multi-professional model comprising of two or more approaches that is piloted and evaluated. The observations and recommendations in this study are limited by: the small number of participants representing five disciplinary groups; only one participant being from a country area; and participants’ limited understanding of CDSS programs.
The lack of literature on the dissemination of decision support software has implications for the development of programs and uptake by health professionals. Ways to seek appropriate funding and provide adequate resources should be explored. The development of CDSS requires a multidisciplinary iterative process of feedback from professionals and modification by designers. Barriers to implementation identified include computer literacy, a lack of complexity within CDSS in addressing non-medical needs of patients and a reluctance among medical staff to consult guidelines during patient consultations. Integrating CDSS into education pathways and making it more available for a broad range of health professionals may be ways of enhancing use of this emerging technology. Designers of decision support systems for use in primary care consultations must account for the practical needs of users when developing computerised support systems. Systems must be acceptable to the format of a consultation, include definitions of what output means, and help facilitate dialogue between the GP and the patient.

REFERENCES
CONFLICTS OF INTEREST

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