Self-reported use and clinical usefulness of second-generation decision support – a survey at the pilot sites for Evidence-Based Medicine electronic Decision Support (EBMeDS)

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Abstract

In Finland, electronic decision support is evolving from searchable knowledge bases toward integration of the knowledge modules into the electronic health record in the Evidence-Based Medicine electronic Decision Support project. We conducted a baseline survey on the extent of use of second-generation decision support (electronic databases) by the various categories of health care professionals. The results showed that the majority of health care professionals used the electronic databases in their clinical practice; more than 80% of participating physicians, registered nurses, public health nurses, and ward nurses used at least four databases. In addition, the respondents considered these databases clinical useful in their practice. This indicates that health care professionals seem to be ready for the third-generation clinical decision support system, producing, for example, automatic reminders.

Keywords: evidence-based medicine, guideline, database, clinical decision support systems

Introduction

The first generation of electronic decision support became available in Finland in the late 1980s in the form of standalone searchable databases delivered on floppy disk and CD-ROM (1,2). In the year 2000, a versatile health professionals' portal (Terveysportti) was launched with wide national coverage, offering easy access to national and local electronic guidelines, a drug formulary, a drug interaction database, and several other databases. Since then, well over 50 million guideline searches have been performed via this portal. It represents the second generation of decision support in Finland. The extensive coverage and continuous updates of the portal (more than 20 million documents opened in 2007) and its content offer many advantages in comparison to the first-generation, standalone products.

At the moment, electronic decision support is developing from searchable databases to integration of knowledge modules into the electronic health record, with Evidence-Based Medicine electronic Decision Support (EBMeDS) (3). Because this third-generation decision support takes as its basis the same evidence-based knowledge already available in the second-generation products, particularly the EBM Guidelines collection (EBMG) (see http://ebmg.wiley.com/), it was considered important to know the extent to which the knowledge in the Web environment actually was used by the various types of health care professionals.

Management of research evidence has become an essential part of health care professionals' work (4–6). However, information search behaviour varies widely among physicians, and electronic databases are infrequently used as primary information sources (7). Also, evidence of the use and usefulness of online systems varies considerably with the study design, methods, and target system (8,9). Magrabi et al. (10) reported that 85% of 227 general practitioners (GPs) who had a computer with Internet access in their consulting rooms used an online evidence system specifically designed to meet the needs of GPs, called Quick Clinical (QC). Of those who used the system, 83% believed that QC had the potential to improve patient care, and 25% reported direct experience of improvements in care. Another online evidence system, the Clinical Information Access Program (CIAP), was used by 61% of a sample of 1076 doctors and 42% of 3088 nurses in public hospitals (11,12). Of the clinician users, 88% believed that CIAP had the potential to improve patient care and 55% had directly experienced this (13).

In Finland, a national structured survey of the use of information technologies in health care organisations in 2005 also examined the use of electronic databases and computer skills of professionals. According to the managers responding, the most popular health care portal, Terveysportti, was used in 96% of the participating organisations. Of these, EBMG (physicians' databases) was used in 92% and nurses' databases in 64%. In more than half of the secondary care organisations, at least 90% of the health care professionals had basic computer skills, with the corresponding figure for health centres being 57%. (14)

Aims of the study

The aim of this study was to explore the use and clinical usefulness of second-generation electronic databases in clinical practice by health care professionals, to provide baseline data for developing, targeting, implementing, and evaluating a third-generation clinical decision support system (CDSS).

The individual study questions were:

1) What proportion of the health care professionals report using electronic databases? Are there differences by health care profession?

2) What are health care professionals' experiences of the clinical usefulness of the databases? Are there differences in this by health care profession?

Material and methods

A cross-sectional Internet-based survey was carried out from October 2006 to May 2007 of public health organisations in the hospital districts of Kymenlaakso and Northern Savo, and in one rural primary care health centre (Saarijärvi–Karstula), which were to become the pilot sites of EBMeDS. The study population included all physicians,

registered nurses, and other health care professionals with at least nursing-level education in Kymenlaakso and Saarijärvi–Karstula (n=1400), excluding dental care, radiology, and laboratory workers. In Northern Savo, the study population included health care professionals who participated in the care of diabetes (n=913). Different categories of profession were included since the plan was to pilot the new CDSS among all these groups. The target group were approached with the help of a contact person nominated from each group. The study was approved by the chief medical officers of the participating organisations.

A questionnaire was designed by the EBMeDS study group complemented by two advisers with psychology degrees. The aim was to develop a multifaceted and practical questionnaire consisting of relevant questions. It was piloted among a convenience sample of health care professionals. After that, each question considered in relation to the objectives of the EBMeDS project. The EBMeDS study group reflected on the feedback and then abbreviated the piloted questionnaire to 27 questions, in the following areas: information technology (9), guidelines (6), job content (3), and background (9). The Webropol-structured form was piloted by four investigators to test its technical validity. This report analyses responses to questions on information retrieval methods, the use of electronic databases (which of the nine electronic databases the respondent uses for seeking evidence in clinical work and what is respondent's experience of the utility of the database) and background questions (gender, age, profession, health care level, hospital district).

Statistical analysis of data was performed via the SAS software. Descriptive statistics were used to examine patterns of use. Comparisons among different groups' responses to the survey items were made by using cross-tabulation with chi-squared statistics for categorical variables and via ANOVA with F statistics for continuous variables. Differences with $p < .05$ were considered significant.

Results

In total, 2252 professionals received the questionnaire, and 806 responded. The response rate was 36% after two reminders. About 55% of the respondents worked in primary care and 45% in secondary care. Of the respondents, 51% were registered nurses, 18% were public health nurses, 17% were physicians, and 14% were other professionals (mostly physiotherapists and ward nurses). Over 90% of them reported having at least average computer skills (see Table 1).

Table 1. Characteristics of the participants

Age (n=788)	%
Below 35 years	13
35-44 years	33
45-54 years	41
55 years and over	13
Gender (n=792)	%
Female	89
Male	11
Health care level (n=799)	%
Primary care	54
Secondary care	45
Other sector	0.5
Profession (n=798)	%
Physician	17
Registered nurse	51
Public health nurse	18
Physiotherapist	6
Ward nurse	6
Other professional	2
Computer skills (n=791)	%
Very good	9
Good	37
Average	49
Fairly poor	5
Poor	1

Over 80% of the respondents used computers for knowledge retrieval. The reported time spent searching for information per week varied between the profession groups (see Table 2). Half of the respondents reported spending between one and two hours a week on information retrieval. The majority reported using at least six of the electronic databases.

Table 2. Proportions (%) of the main sources for information retrieval and time spent per week by professional

Professional (n=797)	Manual	Computerized	Other	< 1h week	1-2h week	> 2h week
Physician	22	77	1	30	46	24
Registered nurse	15	83	2	36	46	18
Public health nurse	13	84	3	40	47	13
Physiotherapist	15	83	2	37	52	10
Ward nurse	18	80	2	15	49	36
Other professional	17	78	5	44	28	28
P[1]		N.S.			0.0118	

[1]p value was measured by Chi Squared test

However, there were statistically significant differences by profession in the utilisation frequencies of these databases (shown in Table 3). Also the most frequently used database varied by profession. Physicians preferred EBMG, physiotherapists Current Care Guidelines (CCG), and the other professionals Google. The drug formulary and Care Pathways were frequently used by all of the groups. The least frequently used databases were the Nurses' Databases among physicians and the drug interaction database (SFINX) among the other groups of professionals.

Table 3. Proportions (%) of the use of the databases by professionals

Database	Physician	Registered nurse	Public health nurse	Physio-therapist	Ward nurse	Other	p[1]
Google	82	93	100	91	96	94	<.0001
Current Care Guidelines	92	83	92	96	89	75	0.0024
Drug formulary	86	87	84	67	73	61	0.0004
EBM Guidelines	97	73	74	78	63	65	<.0001
Care Pathways	77	78	80	89	95	62	0.0222
Nurse's Data-bases	25	87	87	49	82	53	<.0001
UniCri[2]	49	34	35	31	68	12	<.0001
PubMed[3]	73	42	24	63	72	31	<.0001
SFINX[4]	61	23	15	16	23	6	<.0001

[1] p value was measured by Chi Squared test

[2] UniCri=Uniform criteria for access to non-emergency care

[3] PubMed=Medical literature database by the National Library of Medicine

[4] SFINX=Swedish, Finnish, Interaction X-referencing

In addition, we found differences in the use of databases between health care levels. In primary care, the use of the EBMG; of the CCG; and of the uniform criteria for access to non-emergency care (UniCri), published by the Ministry of Social Affairs and Health, were more common than in secondary care (EBMG: 81% vs. 72%, CCG: 91% vs. 83%, UniCri: 42% vs. 33%), while use of medical literature databases (PubMed) was more common in the latter (56% vs. 39%). The level of use of SFINX was quite low in both primary (28%) and secondary care (25%).

There were statistically significant differences by profession in the perceived clinical usefulness of the databases, measured on a categorical scale of one to four. The clinical usefulness of both UniCri and SFINX was reported to be low by all groups (see Table 4).

Table 4. Clinical usefulness of the databases by professionals; means

(Scale of perceived clinical usefulness 1 = not at all, 2 = moderate, 3 = fairly high, 4 = high)

	Physician	Registered nurse	Public health nurse	Physio-therapist	Ward nurse	Other	P[1]
Drug formulary	3.4	3.4	3.3	2.5	3.0	3.0	<.0001
Current Care Guidelines	3.0	3.1	3.2	2.9	3.0	2.4	0.0229
EBM Guidelines	3.5	2.9	3.1	2.9	2.6	2.6	<.0001
Google	2.9	2.9	3.0	3.3	3.3	3.1	0.0285
Nurse's Databases	1.6	3.0	2.8	2.2	2.7	2.7	<.0001
PubMed[2]	2.9	2.4	2.4	2.7	2.3	2.6	<.0001
Care Pathways	2.2	2.6	2.8	2.6	2.4	2.1	<.0001
UniCri[3]	2.4	2.3	2.5	2.3	2.6	2.5	ns
SFINX[4]	2.6	2.3	2.2	1.6	1.8	1.0	0.0031

[1]p value was measured by F-test

[2]PubMed=Medical literature database by the National Library of Medicine

[3]UniCri=Uniform criteria for access to non-emergency care

[4]SFINX=Swedish, Finnish, Interaction X-referencing

Physicians rated EBMG most useful, registered and public health nurses favoured the drug formulary, and for other professionals Google was the most useful information source in the clinical practice. Examinations of the groups' responses according to organisational level revealed plenty of statistically significant differences in the physicians', registered nurses', and ward nurses' groups. The primary care physicians considered UniCri more clinically useful than did the secondary care physicians, who valued the utility of PubMed and Google more highly. Likewise, the registered nurses in primary care considered EBMG, Nurses' Databases, CCG, UniCri, SFINX, and the drug formulary more clinically useful than the nurses in secondary care did. By contrast, the ward nurses in primary care considered Care Pathways, EBMG, Nurses' Databases, CCG, UniCri, and the drug formulary more clinically useful than did ward nurses in secondary care.

Discussion

This is the first survey on the use and clinical usefulness of second-generation decision support covering several categories of health care professionals in Finland. The response rate was low, but the respondents represented a wide variety of health care professions and the whole public sector. The implementation of computer-based second-generation decision support in multi-profession clinical practice appears to have been successful. The majority of respondents used electronic databases in their clinical practice, and over 80% of the physicians, registered nurses, public health nurses, and ward nurses used at least four of the nine databases. The guideline databases, EBMG and CCG, were ranked highly among physicians, nurses, and physiotherapists. In addition, over 90% of the professionals considered themselves to have at least average computer skills. This indicates that the stage is set for the third-generation CDSS at the EBMeDS pilot sites.

The present results indicate that the various categories of Finnish health care professionals use online evidence more frequently than do those in other countries (7,13,15). However, direct and reliable comparisons are impeded by variations in the target systems and questionnaires. Recent results from New Zealand report extensive use of Internet-based resources for clinical information searches among a large number of health care staff (16). We can only speculate that differences in the use of databases by profession and by health care level mainly reflect differences in clinical roles (17) and in work contexts (e.g., home and institutional care (18)), since we did not study the factors associated with use.

The strength of the study lies in its comprehensiveness: all main health care professions and both primary and secondary care were represented, in a contrast to previous studies (7–11). This survey provided useful baseline information on target group performance in the use of second-generation decision support in developing and piloting the new third-generation CDSS (19).

The main weakness was the low response rate. There are two explanations. First, there were some technical problems with the e-mail survey. Second, the busy professionals at the pilot sites were not aware of their organisation's engagement in the project before our survey. It can be speculated that many of the respondents were so-called early adopters (20). Therefore, the results need to be interpreted with caution, since the second generation of decision support may still be in the early stages of uptake. The applicability to the whole country may also be somewhat weak. The questionnaire was developed for the purposes of the EBMeDS project and was piloted but not formally validated.

Conclusions

Second-generation decision support databases are extensively used among all categories of health care professionals in Finland. This indicates that practitioners are probably ready for a third-generation clinical decision support system, producing, for example, automatic reminders.

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