Informatics in Primary Care 2008;16:21–8

Refereed papers

Expectations for the next generation of electronic patient records in primary care: a triangulated study

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ABSTRACT

Background Although primary care physicians are satisfied users of electronic patient records (EPRs) in Norway today, EPR systems may not have reached their full potential. We studied primary care physicians' needs and experiences in relation to EPRs and analysed potential improvements for today's EPR systems.

Respondents and methods This is a triangulated study that compares qualitative and quantitative data from focus groups, observations of primary care encounters and a questionnaire survey.

Results General practioners (GPs) were not satisfied with the level of availability of information within EPR systems. They were especially concerned about follow-up for chronic disease and dealing with patients with multiple conditions. Many expressed a desire for reminders and easier access to clinical guidelines under normal working conditions, as well as the possibility of consultations with specialists from their EPR systems. GPs placed importance on the ability to communicate electronically with patients.

Conclusions Progress toward a problem-oriented EPR system based on episodes of care that includes decision support is necessary to satisfy the needs expressed by GPs. Further research could solve the problem of integration of functionality for consultation with specialists and integration with patient held records. Results from this study could contribute to further development of the next generation of EPRs in primary care, as well as inspire the application of EPRs in other parts of the health sector.

Keywords: decision support systems, personal health records, problem oriented medical records

Introduction

Even though general practice in Norway is almost completely computerised, it is not known whether electronic patient records (EPRs) have fulfilled their potential to support and improve GPs' clinical and administrative work (Box 1). If not, EPRs should be further developed along the lines suggested by users of the systems.

Since implementation of the first EPR in Norwegian general practice in 1979, several systems have come onto the market.[1] The most recent iteration of EPR in Norway emerged in the early 1990s.[2] Up until that time, the GP could expect new functionality with every upgrade. However, the structure and functionality of EPR have changed little in the last ten years, and all three EPR systems now dominating the market were developed between 13 and 20 years ago, possibly indicating either the impending emergence of a new, more complete EPR system for GPs in Norway, or a lack of impetus for the further development of EPR systems.

Although EPR has been successfully adopted in many jurisdictions,[3] while implementation has been slow in others,[4] few studies report representative user

Box 1 Use of computers in Norwegian family practice

Tasks	Performance
Archiving	All electronic Incoming papers are scanned Old paper record archives seldom used
Recording	ICPC codes mandatory for diagnosis Free text notes. SOAP is seldom used Templates are seldom used
Prescribing	Computerised, but printed out on paper National drug database (ATC classification) Electronic medication record
Electronic communication	Nationwide: discharge letters, laboratory and X-ray reports Parts of Norway: referrals, laboratory and X-ray requisitions, sick leave certificates, disability pension forms, patient reimbursement, booking and patient communication
Use of resources	Norwegian Electronic Health Library, Norwegian Medical Handbook, National Secure Health Network Health professional identifier Unique person identifier
Other	Modules for administrative information, scheduling, reimbursement and statistical reports

demands for further development of GP EPR systems.[5,6] Studies that describe functional requirements within the hospital sector often confine themselves to specific clinical domains of interest.[7–9] Almost all EPR systems in Norwegian general practices, in spite of their success, are time and source oriented and do not support medical decision making, nor are they helpful in the sense of presenting medical procedures and guidelines.[10] Although studies recommend problem oriented medical records (POMR) that represent episodes,[11] few have actually evaluated such systems and the potential for success is uncertain.[12,13] Problems or other reasons for encounter are referred to as 'problems' in the rest of the paper. Electronic communication was identified as useful at an early stage.[14] Although it is well adopted in some locations,[15] electronic communication with other health personnel and patients is not yet fully implemented in all parts of Norway. Information needs of rural physicians have been described, but not fully realised on an electronic platform.[16] It is not known why the main EPR systems used in Norway do not offer clinical decision support.

This study combines data from focus groups, observations of doctor–patient encounters and a national questionnaire survey to describe primary care physicians' experiences of using today's EPR in terms of availability of information within the EPR system and other potential improvements.

Respondents and methods

Most Norwegian GPs are self-employed and organised in small medical practices with enlisted patients. The EPR systems consist of the various modules and functions necessary to be independent of paper records.

The study design is triangulated through interviews with GPs in focus groups, observations of the use of EPR in GP practices and a questionnaire sent to a random sample of GPs using one of the three EPR systems used in more than 90% of GP practices. Three focus groups were selected from among groups participating in vocational and continuing GP specialist education programmes, consisting of 24 GPs altogether, five of them female. A total of 80 patient encounters involving four female and seven male GPs were observed. The questionnaire consisted of two major sections and was validated by 20 randomly chosen GPs. An electronic software program randomly extracted a group of 136 GP participants among users of each of the EPR systems. The completed questionnaires were scanned using Teleform, and the data were analysed with SPSS for Windows version 11.5. Collected qualitative material concerning respondents' notions of potential improvement of EPR was identified and subjected to systematic text condensation, then analysed. The perspective of the GP being ultimately responsible for the medical care of enlisted patients supported the

analysis. Attention was focused on helpful records, presentation of information within the records, electronic communication with the possibility of consultations with specialists and integration with records held by patients referred to as Personal Health Records (PHRs). Focus group results, clinical observations and questionnaire results were compared during the analysis process.

Results

Of the 408 GPs invited to answer the questionnaire, 70 were lost due to unknown address, leave of absence or resignation. Of the 338 GPs who received an invitation, 247 (73%) completed the questionnaire; 18 of the respondents were excluded because they used older versions of the systems under investigation, or they used entirely different systems, or their EPR system data were missing. Wherever the sample size in the survey results deviates from 229, this is due to missing data. We found it convenient to present the results from the focus groups, the encounter observations and the questionnaire survey under the same research question headings.

Records with the ability to present relevant patient information and medical knowledge

Focus group respondents claimed that the availability of information within EPR systems had potential for improvement and argued for a better presentation of the information compared with the time- and source-oriented EPR systems used in Norway today. This is particularly important with respect to chronic diseases, according to respondents; it should be easier to identify any issues that should be followed up related to the diagnosis. Several respondents already followed a practice of making separate notes according to each patient issue at the same encounter; they expressed a desire for recorded notes and medical interventions to be automatically associated with the issue or diagnosis at hand, as well as the ability to make this association manually. They wanted ease of alternation between different problems and the ability to track back to the original statement of the problem if that problem changed during the patient's trajectory. Respondents wanted the system to designate problems and diagnoses that had ended, as well as chronic conditions that implied continuous care, and they also wanted to assign information to several problems when relevant. Some respondents complained that multiple record notes could decrease the overview unless a chronological view was also available, insisting on ease of alternation among the various views. These findings are underlined by the following respondent quotes:

> It should be possible to start a search by problems and then the system should present all encounters related to this problem, for instance back pain, so I can see that it started in, let's say 1969; and hence I could see the whole trajectory. (No. 1)

> A problem can start with back pain, but later on it can be obvious in the dialogue with the patient that it rather is a problem in the married life; and then I call it that instead. (No. 2)

During doctor–patient encounters, we observed that clinicians often searched the EPR for information from the last few notes and laboratory results. However, this searching often seemed to rely on memory, and on information from the patient.

In analysing the questionnaire, we found that a majority of GPs (77–82%) agreed that organisation of the record notes by condition, in addition to the traditional chronological view, would give them a better overview, improve search functions and increase the reuse of information in the notes. A majority felt that they probably would write separate condition-specific notes if necessary (Table 1). They also would find it

Table 1 Number of GPs who would write separate medical notes during patient encounters that concern more than one medical problem

Time consumed use of EPR	Unlikely *N*[1] (%)	Less likely *N* (%)	Likely *N* (%)	Total *N* (%)
Equal time consumed as today	15 (6.1)	36 (14.8)	193 (79.6)	244 (100)
Less time consumed than today	14 (5.7)	31 (12.7)	199 (81.6)	244 (100)
More time consumed than today	21 (8.6)	70 (28.8)	152 (62.6)	243 (100)

[1] *N* = Numbers of answers

useful if the system could sort out other information allocated to the problems, such as laboratory and X-ray reports, referrals, case summaries and medications (Table 2).

The overall response in the focus groups concerning the use of records to present relevant medical knowledge was positive. Several new functions were requested: treatment plans with check lists and reminders of what to do during follow-up of chronically ill patients and suggestions for treatments that could increase the quality of care. Most of the respondents wanted more structure in the EPR as well as recommendations for prescribing drugs; they also requested full integration of *The Physicians' Desk Reference* (PDR), as well as automatic updates of the regular list of patient medications from discharge letters. Some of the respondents were resistant to reminders in general unless it was possible to adjust them to the individual patient and the corresponding treatment plan. More refined functions like voice recognition, automatic updates of the record from incoming electronic communication and the ability to bookmark specific record notes for later use were other recommendations for the next generation of EPRs. GPs expressed the view that all help provided by EPRs must be tightly interwoven into the work process, illustrated by this respondent quote:

> If relevant information were only a fingertip away when dealing with symptoms and diagnoses; it would have been interesting. (No. 3)

During doctor–patient encounters, we observed that respondents often reused information about prescription reimbursement regulations that were already registered in the EPR in earlier prescriptions. When prescribing new drugs in the absence of such information, they searched for it in books or electronic media other than EPR. We observed that GPs updated patient drug charts manually from discharge letters. We noted that several respondents used *The Norwegian Electronic Medical Handbook* (NEL) to find information on diagnostics and treatment.[17] A majority of respondents to the questionnaire (76%) seldom or never needed to check the regulations before prescribing drugs partly funded by the state, a finding in contradiction with the results from the focus groups.

Electronic communication can include a dialogue function

Interviews revealed that all of the GPs received medical information such as laboratory results and discharge letters electronically, while a few were able to send computer physician order entries (CPOE) or referral letters electronically. Even though CPOE and referral letters produced electronically in the EPR systems of today were still printed out and sent by mail in an efficient workflow, respondents nevertheless wanted to contribute to increased efficiency by sending this information electronically instead of by paper. All respondents were concerned about the content and presentation of the medical information communicated and wanted the content in referral and discharge letters to be further improved and more useful for the receiver of that information. Respondents suggested that the information could be condensed and still adequate and always accompanied by a summary that clarified the intentions of the letter. They also wanted all forms to be dynamic and transferable electronically. The following quote exemplifies some of these findings:

> It is crucial that requirements from the recipients are taken in account when sending health information. (No. 4)

Respondents expressed the view that they sometimes felt academically isolated and missed the ability to discuss medical subjects with colleagues elsewhere, especially in specialised parts of the health service. Although it is often possible to reach colleagues by phone, there was a barrier to doing so. Respondents wanted the ability to discuss medical issues and receive medical advice when working with patient-specific problems within the EPR system. They also wanted the capability of adding supplementary information if anything was found to be missing in referrals or discharge

Table 2 How useful would it be if the computer program sorted out information by conditions or diagnoses?

Information in the EPR	Useless *N* (%)	Some use *N* (%)	Useful *N* (%)	Totally *N* (%)
Medication	14 (5.7)	47 (19.2)	184 (75.1)	245 (100)
Laboratory results	14 (5.7)	50 (20.4)	181 (73.9)	245 (100)
X-ray reports	15 (6.1)	39 (15.9)	191 (78.0)	245 (100)
Referrals or case summaries	9 (3.6)	37 (15.1)	199 (81.2)	245 (100)

letters. However, information from colleagues must be timely, adequate and specific to ensure relevance and to avoid information overload and disturbance. The dialogue function should be generally asynchronous, but in some cases it should be synchronous if possible. The following quote summarise some of these findings:

> I want a dynamic electronic health communication with the possibility of a written dialog and forwarding missing information. Thus the electronic interchange of health information can lead us out of academic isolation and assure the quality of our work. (No. 5)

We observed GPs searching for and giving advice to colleagues in the same practice, but did not observe phone calls to specialists while we were present. We noted that medical information and advice were found in discharge letters and laboratory and X-ray reports, as well as in the electronic medical handbook NEL[17] and other reference books. Functionality for electronic dialogue was not specifically asked for in the questionnaire.

Personal health records

The ability to communicate electronically with the patient and allowing the patient to register some information in the EPR was discussed in the focus groups. A few GPs had just purchased a commercial solution for clinician–patient communication, and it was well appreciated. They could receive and send inquiries and medical information from the EPR system to the patient and vice versa; patients also had the ability to either book appointments directly in the scheduling module or to send a request for an appointment. Other GPs actively used the EPR system during patient encounters, allowing the patient to read the record and enter comments. Some respondents encouraged patients to write them letters, and later documented this information in the records. This was used more often with social and psychological conditions. Some GPs wanted a capability for allowing patients to see and possibly enter information in their record on terminals in the waiting room or from computers at home. Several respondents emphasised the need for patients to be able to correct their work and demographic details directly in the EPR system. Some respondents claimed that the existing electronic clinician–patient communication solutions could easily be further developed to include a PHR that could communicate with the EPR. The following quote summarises these findings on PHRs:

> Input from the patient himself directly to a defined part of the record before or after the consultation could be useful. (No. 6)

We observed that most GPs communicated with patients by telephone or by letters printed out from the EPR system and mailed. In one practice, we observed that medical information was sent to and received from patients electronically. We also sometimes observed GPs updating basic information such as patient address and employer information but many found it hard to keep the basic module updated. Issues concerning PHRs were not dealt with in the questionnaire.

Discussion

This study finds that GPs consider the availability of information within EPR systems to be unsatisfactory. Rather, they want EPR systems to present both patient information and medical knowledge related to the conditions they are working with. GPs also want EPR systems to support an electronic dialogue function and consideration of the possibility of an integrated PHR becoming a supplement to the EPR.

Previous studies as far back as the late 1960s show that records oriented by condition could be preferable in terms of clinical care, education and research.[11] Even though one study proved that condition-oriented records in primary care work better than those oriented by time, such medical records have not yet been widely accepted in primary care.[18] This study finds that another orientation of the record, in addition to time and source, must be the support of effective workflow – and several solutions to bring forward EPR systems that address this issue have been proposed.[12,19] Some studies indicate success for POMR in shared care.[20] One study found no success when implemented in inpatient hospital care, unless used on patients with a small number of simple conditions who are admitted for only a short time; although it may be argued that one limitation of this study is that the observation time was brief and the implementation incomplete.[21]

Even though about 30 GPs in Norway have adopted POMR representing episodes over a span of 20 years,[18,22] the concept has not had any breakthrough among the dominant vendors in Norway. According to our own and other research, EPR systems should become problem oriented in order to integrate efficient decision support.[23,24] Decision support can improve clinical practice as a computer-based part of clinician workflow if recommendations are provided rather than assessments activated at the time and location of decision.[25] Studies demonstrate positive effects on clinical performance, while the effects on patient outcome are understudied and appear inconsistent when studied.[26]

Respondent GPs wish to establish an electronic dialogue function within EPR systems and want to use

this function for consultations with specialists. Although it is challenging to replace oral, real-time routines with an electronic dialogue function that seldom can be synchronous, studies suggest that consultations by email can be efficient and valuable given acceptable response times.[27] Our finding that EPR systems should be further developed on this point is supported by other studies.[28] Few studies have shown that positive effects from the use of EPR can be explained by electronic communication as such.[29] Even though electronic communication is desirable, the persistent possibility of inadequate information and unsuccessful integration with the EPR system remains if development is not in accordance with user requirements on content and presentation.[30] While hospital physicians can rely on immediately available colleagues for clinical information, GPs often work more autonomously and sometimes need more specialised advice than can be offered by the colleague next door.[16] Physicians report that they initiate consultations with specialists due to the perceived reliability of an expert's opinion, urgency, cost, timeliness, accessibility, convenience, fear of malpractice litigation, reassurance, desire for an academic discussion and autonomy.[31] We have not found studies that evaluate electronic consultations with specialists fully integrated in EPR systems.

Some countries have established a national personal record on different platforms.[32] Issues of autonomy, access control and skepticism from health personnel must be considered with respect to PHRs.[33,34] Some studies have shown increased patient satisfaction, increased quality and reduced costs, especially for chronically ill patients.[35] According to Tang, PHRs integrated with EHR systems provide greater benefits than would stand-alone systems for consumers; a conclusion supported by our findings.[36] Some studies have demonstrated limited functionality and representation of medical information in currently available PHRs.[37]

Triangulation of methods can strengthen validity and relevance as well as credibility, repeatability and transferability.[38,39] Qualitative methods are recommended in evaluation of health information systems and they can be useful for suggesting further improvement.[38,40] Qualitative methods can assist in identifying new issues and in this case neither consultations with specialists nor PHRs were planned for in the questionnaire. The selection of GPs for the focus groups and observations was pragmatic, with both rural and urban practices represented. We had no indication that the relatively few female GPs among the respondents in the focus groups argued differently from their male colleagues, and neither did questionnaire answers vary in relation to age percentiles or sex. It is not probable that a different sample selection method would have yielded different results. Observer triangulation was carried out to ensure that important or contradictory quotes related to the research questions were not omitted and to avoid misunderstandings in the transcription from oral to written information. Group interviews may require reflection concerning different opinions with consequent internal informant validation, while the issue of the author's background being similar to those of the respondents has been discussed and found beneficial.[41]

Conclusion

This study indicates that Norwegian GPs desire an EPR system that features functionality which includes a problem oriented representation of information based on an episode-of-care architecture. Respondents also expressed the need for active decision support and consultation with specialists, and they foresaw benefits from integration with patient held PHRs to allow asynchronous communication. The use of both qualitative and quantitative methods has led to interesting and contradictory findings that would not have been uncovered using any one method alone. The need for PHRs and the usability, efficiency and possible benefits of consultations with specialists and helpful condition-oriented EPR systems need to be studied further.

ACKNOWLEDGEMENT

Thanks to Professor Carl-Fredrik Bassoe at the Norwegian EHR centre, MTFS, 7489 Trondheim, NTNU for kind advice.

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CONFLICTS OF INTEREST

None.

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Accepted February 2008