

EGOOZ: Specifying the Components of Electronic Patient Record-related Education

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Summary

Objective: To determine whether educators consider electronic patient record (EPR)-related education necessary and if so, what subjects have to be taught more extensively in the future.

Methods: A list of possibly relevant subjects was determined from the literature. A questionnaire was designed which contained those subjects and the respondents were asked to indicate, for each subject, its competency level and required competency level in current teaching. Since the response rate was low a second questionnaire was developed to have the results of the analysis of the first questionnaire validated by a larger group of educators.

Results: In total 45 learning goals were identified from the literature. The questionnaire was sent to representatives of several disciplines: basic medical education, medical specializations, pharmacy, dentistry and nursing. The analysis of the first questionnaire resulted in nine subjects that needed more attention in the future. Because of the low response the needs could not be specified for the individual disciplines. This insight was obtained from a second questionnaire. The response to this questionnaire was high. From the analysis of the second questionnaire differences between views of educators involved in the training of GPs and educators involved in the training of other specializations were observed.

Conclusion: Educators find EPR-related education important. There are different opinions about the phase in which EPR-related education should be given.

Keywords

Electronic patient records, education, medical informatics, curriculum

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Introduction

Health professionals increasingly need medical informatics education. The work of health professionals is dominated by information collection, storage and retrieval and reasoning. Health professionals use both patient data and medical and nursing knowledge for patient management. However, the amount of medical and nursing knowledge increases so quickly that health professionals cannot stay fully informed. They therefore need methods and tools to access relevant information or knowledge at the time it is needed. Medical informatics has developed tools and methods that can make the life of health professionals easier. This includes tools to acquire relevant knowledge but also tools to obtain patient data.

With electronic patient records (EPRs), clinical patient data can be stored and retrieved. When the data are expressed with the help of a standard vocabulary functions like reminding, alerting and providing access to relevant knowledge are easily interfaced with the EPR. Health professionals should have insight in and knowledge of the principles, concepts and methods underlying electronic patient records. Part of the education in medical informatics should therefore be devoted to conveying that knowledge.

In the Netherlands, national research agencies and the government stimulate the introduction of EPRs in health care. These organizations also realized that the intro-

duction of EPRs in healthcare environments needs to be accompanied by educational and training programs. The medical informatics departments of the universities of Maastricht, Rotterdam and Nijmegen were asked to determine which subjects related to EPR-related education are still underexposed in university and vocational training programs. They were asked to investigate a broad spectrum of disciplines covering medicine (both basic medical education and the training for medical specialists), nursing, pharmacy and dentistry. In this contribution the results of this study with respect to basic medical education and the training for specialists are reported.

Methods

Determination of Potential Learning Goals

To determine which EPR-related topics are underexposed in the various programs, a reference list is needed that contains all EPR-related topics. Such a reference list was composed via an analysis of the literature. The relevance of each topic in the list had to be determined. The obtained topics were therefore reformulated as learning goals and grouped under a number of subject headings. The determination of the relevance was considered to be a task for the educators.

Determination of the Relevance of Learning Goals

We designed a questionnaire that had a dual purpose. The reference list with learning goals was incorporated in the questionnaire. Firstly it provided an extensive overview of potential learning goals to the educators. For each of these learning goals the educators had to indicate, on the questionnaire, to what extent the learning goals were pursued in the current curriculum. Secondly they were asked to state the relevance of each learning goal (by indicating the relevance for an ideal, future curriculum). For both purposes they had to use a five-point scale, ranging from 'not relevant' to 'should be known or mastered at an expert level'.

The various educational institutions were asked for the names of persons who had good insight into the curriculum of their discipline (medicine, dentistry, nursing, pharmacology). These educators then received the questionnaire. Their answers were analyzed and for each learning goal the difference between the indicated current and future relevance was determined. The learning goals with the largest discrepancy between future and current level were considered to be learning goals that needed more attention in future curricula.

Evaluation of the Results

Since the response to the questionnaire was low, we decided to check the results of our analysis. We developed a second questionnaire for this. The relevant learning goals were reformulated into theses, expressing that students at the end of their study possessed insufficient knowledge about those learning goals. When several learning goals belonging to the same subject were present the thesis was formulated in such a way that it would cover those learning goals. In total nine theses were formulated in the questionnaire. The respondents could indicate for each thesis whether they agreed, disagreed or had no opinion.

A tenth thesis was added asking the respondents to indicate whether EPR-related education was really needed and if so at what phase in the education.

This questionnaire was sent to a larger group of educators to check whether they agreed with the identified learning goals. These educators were members of educational committees in their respective disciplines. The answers were again analyzed and conclusions drawn.

Results

Literature Survey

We analyzed the literature [1-5] and compiled a reference list of topics from the results. Here we present the four main sources that contributed to this reference list.

In the Netherlands, the learning outcomes of the medical study are stated in the so-called Raamplan 2001 Artsopleiding (Framework 2001 for the education of physicians) [1]. Medical informatics education is not explicitly mentioned in this framework. However, a number of learning outcomes mentioned in the framework were suitable for our purpose.

Possibly relevant learning outcomes mentioned in the framework are for example: physicians should be able to record the information concerning patient encounters systematically, clearly and in a way that is auditable; they should have knowledge of the different types of recording, including those made possible with information technology; the physician should be able to systematically approach a health problem using relevant problem-solving methods and decision analysis approaches; also the physician should be able to retrieve relevant new knowledge from the literature using modern technologies; finally the physician should have knowledge of the legal aspects of new technologies. These topics were included in the reference list.

The institutes for higher vocational training of healthcare professionals emphasize the competencies healthcare professionals should have. Since these competencies comprise a complex of skills they speak about information skills related to these competencies. We also retrieved learning goals from the description of these information skills.

The Health and Medical Informatics Education Working Group of IMIA (the International Medical Informatics Association) issued recommendations for medical informatics education [2]. The IMIA recommendations focus on pre- and post-graduate education. It not only presents medical informatics topics for the groups we are interested in but also the topics relevant for programs dedicated to medical informatics. What knowledge and skills have to be learnt depends on career progression (bachelor, master, doctor, etc.). It is emphasized that medical informatics instruction should be integrated within educational programs (medicine, nursing, physics, informatics or computer science). Many topics mentioned in the recommendations were included in our reference list.

The Information Authority of the NHS [3] defined competency profiles with respect to health informatics for the various functions available in healthcare. These competence profiles describe the level of knowledge and skills one should master for the various subjects. A number of the topics were directly related to the EPR and were included in our reference list. A five-point scale was used for indicating the levels. We used the same categorization in our study. The following levels are discerned:

- No skills or knowledge are required.
- A basic awareness and few, if any skills are required.
- Knowledge and skills are required for good use of and insight into the various aspects of a subject.
- Specialist skills and knowledge are required.
- Full knowledge and skills are required (at the level of the medical informatics specialist).

The topics in the reference list were reformulated as learning goals. In Table 1 we present an example of two such learning goals belonging to the subject "problems with paper patient records".

Questionnaire Design

The questionnaire was divided into two parts: one concerning prerequisites (knowl-

edge and/or skills the students should have before they can start with EPR-related education) and one concerning EPR-related education. The learning goals (45) were grouped under a number of subject headings (11). The first part contained three subjects (general skills; general knowledge; scientific basis of medical practice). The second part contained eight subjects (patient records, general; problems with paper records; electronic patient records; decision support; coding; communication; secondary use of data; legal aspects of EPRs).

For each learning goal (specifying either a knowledge or skills requirement) the questionnaire offers the opportunity to rate the level of the learning goal, in the same way as suggested by the NHS. The levels had to be entered twice: once for the current situation and once for the ideal, future situation.

Questionnaire Analysis

The questionnaire was sent to 53 persons. If the questionnaire was not returned within a month the corresponding person was contacted again. In total 30 questionnaires were returned (57%), but of those 30, seven questionnaires were blank. So the actual response rate was 44%, which was rather low. Also, a relatively large number of 'no opinion' responses were obtained for both the current and the future situation.

The 23 filled-in questionnaires were grouped into the following categories: basic medical education (8), training for GP (2), training for nurse (academic and non-academic) (5), training for specialist (excluding GP training) (1), training for pharmacist (2), training for dentist (1), and training needs according to the heads of medical informatics departments (4).

For each of these groups it was determined which learning goals, according to the opinion of the respondents, needed more attention (the indicated level for the future curriculum is higher than the level of the current situation).

The analysis revealed that, in the current curricula of basic medical education, enough attention is paid to the pre-requisites and the learning goals belonging to the subject 'patient records'. All remaining subjects

Table 1 Learning goals belonging to the subject "problems with paper patient records"

Has knowledge of	shortcomings of, respectively problems with, paper patient records
Has knowledge of	the number and types of preventable errors that can occur when working with paper patient records

should be taught more extensively to reach the competence levels 'knowledge and skills are required for good use of and insight into the various aspects of a subject' and 'specialist skills and knowledge are required'.

Also, in the training for nurses, the pre-requisites and the subject 'patient records' in general are already covered sufficiently. The respondents indicated that the other subjects were treated at too low of a level.

No univocal insight concerning EPR-related education in the training for GPs was obtained due to the low response. One respondent indicated that the subjects 'coding' and 'communication' should get more attention.

In one of the pharmacy faculties attention was paid to prerequisites, the general aspects of patient records and to legal aspects. According to the respondents all subjects should be taught more extensively to reach the competence levels 'knowledge and skills are required for good use of and insight into the various aspects of a subject' and 'specialist skills and knowledge are required'. The number of respondents was low, however.

For dentistry the response was very low (only one of the four persons returned the questionnaire). This respondent indicated that all subjects were taught at a too low level. In future curricula the competence levels 'knowledge and skills are required for good use of and insight into the various aspects of a subject' and 'specialist skills and knowledge are required' should be reached. Also, no insight was obtained concerning the future level of EPR-related education in training for specialists. In current training, attention is paid both to the use of electronic patient records and to decision support.

As a last group the heads of departments of medical informatics were asked about their opinion regarding EPR-related education. According to them all students should reach the competency level 'knowledge and skills are required for good use of and insight into the various aspects of a subject'.

Many respondents did not know of a number of learning goals whether they were treated in the current curriculum.

Because of the low response it was not possible to separately determine which subjects need more attention for each group. We only could conclude that in general more attention should be paid to the scientific basis of medical practice, to the principles concerning the structuring of patient records, to the shortcomings of paper records and the possibilities and limitations of EPRs, to the role of EPRs in decision support, to the limitations and advantages of coding and electronic data exchange, to the secondary use of patient data and to legal aspects of electronic patient records.

Evaluation of the Conclusions

A second questionnaire was developed to determine which subjects need more attention in each of the groups. The subjects that could need more attention were presented as nine theses in the questionnaire. Respondents could agree, disagree or have no opinion concerning the theses. In addition, the respondents were asked whether EPR-related education is necessary and if so in what phase of the education (during the basic education, during the specialist training phase (for physicians) or as CME (Continuing Medical Education)) EPR-related education should be given (see Appendix 1 for the contents of the questionnaire).

The questionnaire concerning the basic (medical, pharmacy, nursing and dentistry) education was sent to the teaching members of committees responsible for education within the corresponding faculties. The questionnaire concerning the specialist training (including the training for GP) was sent to the professors responsible for the training. In total 233 questionnaires were sent and 180 responses were received (response of 77%).

In this contribution we limit ourselves to a discussion of the results for the basic medical education and for the training of specialists.

The questionnaire concerning the basic medical education was sent to 57 persons

and 44 responses were received, of which six were blank. The results are presented in Table 2.

The questionnaire concerning the specialist training was sent to 150 educators, comprising 20 different specializations. In

total 118 forms were returned, one blank. In Table 3 the results concerning training for GPs and the results concerning the training for other specializations are presented separately.

Table 4 presents the results of the last thesis about whether EPR-related education is needed and if so at what stage of education or training. Most of the respondents consider EPR-related education relevant. It is not clear from the results in which phase of the education EPR-related education should be given.

Table 2 Responses concerning basic medical education

At the end of their study the student possesses insufficient knowledge of ...	Agree	No opinion	Disagree
The scientific basis of medical practice	45%	0%	55%
The various types of organization of patient records	34%	29%	37%
The shortcomings of paper records	74%	13%	13%
The possibilities and shortcomings of EPRs	68%	21%	11%
Decision support with EPRs	63%	26%	11%
The advantages and disadvantages of coding	39%	37%	24%
Electronic data exchange	55%	24%	21%
The secondary use of EPR data	45%	24%	32%
The legal aspects of EPRs	76%	18%	5%

Table 3 Responses concerning the training of specialists and GPs

At the end of their training specialists have insufficient knowledge of ...	Specialist (n = 110)			GP (n = 7)		
	Agree	No opinion	Disagree	Agree	No opinion	Disagree
The scientific basis of medical practice	18%	1%	81%	14%	0%	86%
The various types of organization of patient records	27%	14%	59%	14%	14%	71%
The shortcomings of paper records	45%	9%	45%	43%	29%	29%
The possibilities and shortcomings of EPRs	75%	7%	15%	43%	0%	57%
Decision support with EPRs	77%	7%	16%	71%	0%	29%
The advantages and disadvantages of coding	48%	10%	42%	57%	14%	29%
Electronic data exchange	50%	13%	37%	86%	0%	14%
The secondary use of EPR data	47%	5%	47%	71%	0%	29%
The legal aspects of EPRs	88%	5%	7%	43%	0%	57%

Table 4 Stage of the education in which EPR-related education should be given

EPR-related education	Basic medical education (n = 37)	Specialist training (n = 117)
... is not needed	3%	3%
... only as CME	5%	8%
... during basic education curriculum	21%	38%
... during the training for specialist	42%	26%
... both during basic education and the training for specialist	29%	26%

Discussion

The goal of this study was to determine whether educators think that EPR-related education is necessary and if so, which subjects should be taught more extensively in the disciplines considered. In this contribution we focus on basic medical education and the training for medical specialist.

We designed a questionnaire containing an extensive list of possibly relevant subjects and asked experts to indicate which subjects were indeed relevant, whether these subjects are already taught in the various programs and whether the subjects need more attention in the future.

The response to the questionnaire was disappointing. This may partly be due to the fact that the questionnaire was rather long: the respondents had to provide their opinion about 45 learning goals. We discovered that the respondents did not always know whether the mentioned subjects were already part of the curriculum. EPR-related education may be given in different parts of the curriculum but from the description it may not always be clear whether an EPR-related component is included. Also it appeared that the experts not always had a good idea of what EPR-related education is necessary in the future, given the relatively large number of 'no opinion' responses. Still, nine subjects could be identified that possibly need more attention in some or all curricula. With the help of the second questionnaire we determined these subjects for the various curricula.

The low response to the first questionnaire does not mean that educators think

that EPR-related education is not needed. This could be concluded from the analysis of the second questionnaire. Educators find EPR-related education important as can be concluded from the high response to the questionnaire and from the fact that only 3% of the respondents indicated that EPR-related education is not needed.

For basic medical education four subjects were identified (more than 70% of the respondents agreed or less than 20% disagreed with the thesis) that need more attention: shortcomings of paper records, possibilities and shortcomings of EPRs, decision support with EPRs and legal aspects of EPRs. Three of the above mentioned subjects were also mentioned by the specialist educators. These educators indicate that at

the end of their training physicians in training possess enough knowledge about ‘shortcomings of paper records’. Apparently the trainees get enough practical experiences to recognize those shortcomings.

Educators responsible for the training of GPs mention other subjects that need more attention than the educators of other specializations. They do agree about decision support. But GPs mention electronic data exchange and the secondary use of data as important subjects. Perhaps this difference can be explained by the fact that GPs use EPRs and therefore during the specialization phase GPs in training are acquainted with EPRs. Therefore GPs in training, contrary to specialists in training, already have obtained insight in the possibilities and limitations of

EPRs and their legal aspects. We may conclude from the observed difference between the two groups of specialists that a need will arise for other learning goals as soon as the subjects that are necessary for the basic medical curriculum are mastered.

The majority of the respondents agree that EPR-related education is necessary. About one third of the respondents state that EPR-related education should be given both during basic medical education and during the training for a specialist. There is no consensus about when the education should be given. Educators of the basic curriculum indicate that the education should be given during specialization whereas specialist educators indicate that the education should be given in the basic curriculum.

Appendix: Evaluation Questionnaire

At the end of their study the students ^a possess	Agree	Disagree	No opinion
1. . . . <i>insufficient</i> knowledge of the scientific basis of the medical practice (like evidence-based medicine and the role of guidelines).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. . . . <i>insufficient</i> knowledge of (the importance of) the various types of organization of patient records.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. . . . <i>insufficient</i> knowledge of the shortcomings of paper patient records (for example to which preventable errors they may lead).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. . . . <i>insufficient</i> knowledge of and practical experience with the possibilities and limitations of electronic patient records.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. . . . <i>insufficient</i> knowledge of the decision support electronic patient records can offer.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. . . . <i>insufficient</i> knowledge of the advantages and disadvantages of the coding of medical data.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. . . . <i>insufficient</i> insight in the possibilities and limitations of (electronic) data exchange.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. . . . <i>insufficient</i> knowledge of the use of data from patient records for other purposes than the direct care of patients.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. . . . <i>insufficient</i> knowledge of the legal aspects of electronic patient records.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Education concerning electronic patient records . . .	Indicate the options with which you agree:		
A . . . must primarily be given during basic education ^b .			<input type="checkbox"/>
B . . . must primarily be given in the specialization phase ^c .			<input type="checkbox"/>
C . . . must primarily be given after specialization.			<input type="checkbox"/>
D . . . is not necessary in the basic education or specialization phase.			<input type="checkbox"/>

^a medical doctor, pharmacist, dentist, or the relevant specialism
^b medical doctor, pharmacist, or dentist
^c medical doctor, or the relevant specialism, question not asked for the pharmacy and dentistry study

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