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Implementation of electronic health records in Polish outpatient health care clinics – starting point, progress, problems, and forecasts

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Abstract

Introduction. The Act on Information System in Health Care, dated 28 April 2011, imposes an obligation to record patients' medical documentation in an electronic form (EHR – Electronic Health Records) on the providers of health care services, starting from 1 August 2014. On 23 July 2014, an amendment of the Act was enacted, based on which the date of obligatory introduction of health records in paper or electronic form was postponed until 31 July 2017. At various health care entities there are two different methods of creating health records (HR); therefore, the implementation of the provisions of the Act poses a significant number of problems and complications.

Objective. The objective of the study is to present the starting point, progress, problems and forecasts regarding the implementation of electronic health records at health care entities which provide services within the scope of specialized outpatient care (SOC).

Materials and method. The subjects of this research were 475 health care entities which provide services within the scope of specialized outpatient care (SOC) operating in Poland. The applied research tool was a survey questionnaire. The applied research technology was a Computer Assisted Web Interview (CAWI). The research was conducted between February – April 2014. The data was analyzed with the chi-squared test of independence.

Results. In the period of the research, 233 health care entities were at the stage of preparation for the implementation of HER: 116 – in the process of implementation; 72 – after implementation, and only 54 were already recording their documentation in an electronic form.

Conclusions. Most health care entities providing specialized outpatient care would not have complied with the provisions of the Act on Information System in Health Care had the deadline for implementation of EHR not been postponed. Five months before the date stipulated in the first version of the Act (August 2014), about 74% of health care entities covered by this study did not yet have a ready EHR system. The study also showed that 2 years is insufficient time for the entire process of informatization of a health care establishment.

Key words

Electronic Health Records (EHR), medical documentation, electronization, Specialized Outpatient Care (SOC)

INTRODUCTION

The Act on Information System in Health Care was enacted on 28 April 2011. It imposes on the providers of health care services an obligation to record patients' medical documentation in an electronic form, starting from 1 August 2014 [1]. Over the period of three years, each health care establishment providing health care services should implement an appropriate software system for, among others, keeping patient histories in an electronic version.

Three years later, on 23 July 2014, an amendment of the Act was enacted, based on which the date of obligatory introduction of medical documentation in paper or electronic form was postponed until 31 July 2017.

OBJECTIVE

The aim of this study is to present the starting point, progress, problems and forecasts regarding the implementation of electronic health records at health care entities which provide services in the scope of specialized outpatient care (SOC). The research was designed to evaluate the stage at the beginning of this transition of implementation of HER, and at which health care entities providing SOC services, are as well as the differences between the stages of informatization of the health care entities in individual regions (referred to as 'Voivodeships') in Poland.

Health care entities have different methods for creating health records. The differences also regard the scope of information that should be recorded in such documents, and the number of served or declared patients at each health care establishment is also different. Due to these facts, implementation of the provisions of the Act poses a significant number of problems and complications.

As international research shows, implementation of electronic health records within an outpatient setting is complicated but eventually beneficial. In the USA, only 30% of the estimated 1.1 billion annual US patient visits in 2011 were delivered in the settings where electronic health record were available [2]. The study published in 2012 revealed that 59% of the 127 analyzed primary care clinics in California had not implemented electronic health records (EHR), 21% were all electronic, and 19% were both paper and electronic.

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Moreover, 2% of them had no plans to implement EHR. The majority of clinics allocated less than 6% of their budget to health information technology and 64% of those planning on implementing an EHR reported needing additional staff [3]. The EHR implementation in US hospitals has been more effective. As the American Hospital Association Annual Survey of Hospitals – IT Supplement revealed in 2014, 59% had at least a basic EHR [4]. In 2014, the Centers for Medicare & Medicaid Services in the US introduced financial incentives for providers to meaningfully use their electronic health records to engage patients online – mainly through patient portals. Such tools should enable secure access to personal medical records, communication with providers, various self-management applications, and administrative functionalities [5]. Patient engagement will eventually lead to providers' higher motivation to maintain and constantly improve EHR as a way of mutual communication.

The UK, another pioneering country in EHR implementation, has encountered several obstacles after the National Health Service (NHS) embarked in 2002 on a strategy aimed at introducing commercial, centrally-procured, EHRs into hospitals throughout England. Hospital electronic health record applications are being developed and implemented far more slowly than originally envisioned and NHS trusts themselves were not party to centralised contracts with their providers [6]. According to researchers, hospital staff were not consulted in the matter of choice of systems, which lead to frustration. Moreover, engagement efforts focused mainly on clinical staff, with inadequate consideration for management and administrative staff [7]. Nonetheless, general support for the development of integrated EHRs for health care provision, planning and policy, and health research, seems to be prevailing in the UK, and the citizens mainly support the impact of EHR on their own personal care, such as access to personal medical record on-line [8].

The most universal recommendation for policy makers and project managers is to consider EHR implementation as a typical, but also highly specific, change in management [9]. Schoen at al. analyzed the progress of the adoption of EHR among primary care doctors in two studies undertaken in 2009 (nearly after the implementation) and in 2012 [10]. The authors collected data from Australia, Canada, France, Germany, the Netherlands, New Zealand, Norway, Switzerland, the UK and the USA, and found progress in the use of health information technology in health care practices, particularly in the USA. Nevertheless, they also stressed high variability in a local context – strategies, resources and communication were different in the countries being evaluated. In 2009, US and Canadian physicians declared less support for EHR then their counterparts, whereas in 2012 the difference was negligible. The main complaints were related to delays in receiving both information from other health care providers, and feedback on their own performance. When data were collected in an electronic manner, they expected much faster communication and reports.

EHR has been implemented with constrains also in Canadian health units. Physicians have been reluctant to adopt it; therefore, researchers have tried to identify the major obstacles and ways to overcome them. First of all, they found that perceptions about EHR between doctors using and not using the system did not differ substantially. The majority of doubts related to general rationale for such systems; therefore, improved communication was recommended – stressing more EHR particular relevance to physicians' jobs, showing also evidences that the electronic method is easier to use than paperwork [11]. Further research showed additional barriers [12]. The most important findings for policy makers and IT specialist regarded ascertaining the value of EMRs, based on retrospective analysis of existing systems. The researchers also pinpointed the necessity to rethink the way data are entered and retrieved, as well as to provide better understanding of data sharing, because observations showed lack of agreement between stakeholders on these issues.

MATERIALS AND METHOD

The subject of this research was health care entities (managing personnel) which provide SOC services within the territory of Poland. The research tool applied was an original survey questionnaire containing nine single or multiple choice questions, as well as open-end questions. The applied research technology was Computer Assisted Web Interview (CAWI). The questionnaire was available through a web browser. Respondents (managing personnel) received an e-mail message which directed them to the relevant questionnaire. Each questionnaire was generated separately for each respondent. The questionnaire was compatible with all the popular web browsers. The form's structure also allowed it to work on older computers and guaranteed the security of stored data.

A database of health care entities was compiled for the needs of this research. Data for the database was extracted from the Register of Health Care Providers, available at: www.rejestrzoz.gov.pl.

The survey questionnaire was made available through a special website, and the entire project was compiled into a single Internet website accessible through an http link. The link was sent to 1,000 randomly chosen health care entities which provide specialized outpatient health care services. The total number of health care providers in the Register providing SOC services stood at 10,489 [13]. The return rate for the 1,000 links sent was 475 questionnaires, which represented about 4.5% of SOC health care entities in Poland. The research was conducted between February – April 2014.

Among the studied health care entities, 57.47% were enterprises, 13.89% Independent Public Health Care Entities (Polish: SPZOZ), and the rest, amounting to circa. 8%, respectively, were research institutes and associations. Due to the fact that only about 6% of respondents were State-funded entities, and legal entities (organizational units) operating on the basis of provisions governing the relationship between the State and churches and religious associations, these two groups were merged together and presented in the research as 'Others'. The data was analyzed with the chi-squared test of independence.

RESULTS

As much as 40% of health care entities believed that the introduction of EHR will significantly improve the functioning of the health care system in Poland and, according to one in three respondents, EHR will improve the system to an insignificant extent. Only 16.84% of respondents believed

that electronic documentation will decidedly not improve the existing system. A large part of managing personnel of health care entities (10.95%) had no opinion on EHR, which may suggest little interest in the issue of electronization of health care on the part of entities.

The largest beneficiary of the EHR implementation process in Poland, according to the respondents (40.42%), is the National Health Fund, followed by patients (19.16%), health care entities (16.84%) and doctors (15.16%). Private insurance companies and the Social Insurance Institution were indicated by only 4.21% and 2.53% of respondents, respectively. A few entities suggested that it will be mostly the Tax Office and IT companies which will profit from the informatization of health care entities.

According to the respondents, the most serious obstacle for health care entities in implementing EHR will be the costs related to electronization – about 60% of entities covered by the presented study indicated this issue as being very serious (Tab. 1). Immediately after the costs of informatization, health care entities named the following problems connected with the implementation of EHR: the need to train medical personnel (34.53%), and the pressure of time in relation to the implementation (30.11%). Choosing the provider of the IT system, protection of medical data or protection of the medical documentation from unauthorized access, were indicated as the least serious difficulties (21.47% and 18.11% of entities, respectively, identified this as a serious problem). This is because in most cases protection of medical data will be the obligation of system providers.

Table 1. The most frequently indicated problems related to the EHR implementation, along with the weight attributed to them, indicating the importance of this difficulty (1= low importance, 5=high importance)

Weight attributed to individual statements	Costs of informatization and system maintenance	Choice of system provider, who will ensure keeping EHR in accordance with the current and future provisions of law	Difficulty ensuring patients' personal and medical data protection	Difficulty protecting documentation from access by unauthorized persons	Pressure of time imposed by legal provisions	The necessity to train medical personnel
1	22	79	78	102	80	52
2	27	81	89	112	74	67
3	66	112	141	115	100	91
4	79	101	81	60	78	101
5	281	102	86	86	143	164

In the question regarding problems connected with EHR implementation, entities were given an opportunity to express their thoughts about the entire process. Health care entities expressed their discontentment with the legislators or the NHF for not helping them to correctly interpret and implement the generally imposed procedure in practice. This problem was indicated in 8.24% of all additionally given answers. The continuous changes in legal provisions were not viewed positively by health care entities. Moreover, the respondents claim that, regardless of the numerous legislative changes, the definition of medical documentation itself has not yet been made sufficiently precise, which results in the fact that the form of keeping HER itself, depending on the type of services provided, has also not been defined (6.59% of answers to open-end questions). The respondents additionally stated that the form of keeping EHR at the entities which provide services at patients' homes, is not known. This problem was pointed out by thee entities (1.65% of answers to open-end questions). Recording data in the EHR in real time would not be possible in this case (such as during patient examinations).

Another problem indicated by health care entities in reference to the EHR implementation had to do with a host of difficulties in connection with IT:
- IT systems available on the market are not adjusted for quick and easy implementation, choosing a provider of intuitive software is practically impossible (this aspect of informatization was indicated by 4.32% of entities which gave an answer to this optional open-end question);
- the need to constantly upgrade software, which may translate into downtimes and additional costs (1.08%);

the need to choose software which will guarantee:
- compatibility between entities,
- the option to maintain continuity of treatment in unusual situations (server breakdown, etc.) (4.32%);
- difficulties with transferring the databases, X-ray images, etc. (1.08%).

Some entities indicated other technical issues, such as those related to connections, access to the Internet or bandwidth not fast enough, or Internet security (5.95%) as another implementation-related difficulty.

Many entities also indicated the unwillingness of their personnel (doctors, older employees, managing staff) and lack of interest in EHR as a serious implementation difficulty (17.84% of answers to open-end questions). Other problems mentioned included lack of training for small entities organized by the process organizers (1.08%), organizational problems, such as premises which are too small to accommodate more computers (1.08%), or the need to generate paper copies of documentation at a patients' requests (0.54%). It should also be highlighted that health care entities believed that electronization of medical documentation extended the amount of time needed for each visit (10.27%), which may lower the overall number of patients seen during the day, or lower the quality of services by limiting contact with patients. The research revealed some opinions that institutions that control the implementation of EHR still put pressure on health care entities to use paper documentation, as EHR is a huge obstacle for them in terms of control (an opinion was expressed by two entities covered by this research).

Health care entities also expressed some positive opinions about EHR implementation in their analyses. This proved that the condition of a part of health care entities in what regards EHR implementation is good. A part of them is of the opinion that postponing the obligatory implementation of the system for transferring medical documentation between entities is unnecessary (2.70%). 81.68% of respondents saw a chance for better communication between health care entities, thanks to the electronization of health care. At the same time, half of the respondents (54.11% and 54.53%,

respectively) were of the opinion that physicians will be able to raise the effectiveness of treatment by having access to the entire patient's history, and that they (as well as the State) will be able to control the consumption of refunded medical products.

Before it will be possible to evaluate the effectiveness and efficiency of the EHR implementation process at health care entities, it is necessary to complete it. Every third respondent (33.89%) believed that one to two years is a feasible time frame for the completion of the process; 26.32% of respondents thought that this period should be longer than two years, but less than five years. The remaining answers about the time for implementation were: up to one year (20.63%), up to half a year (8.84%) and five to 10 years (8%). Only 2.32% of the researched health care entities claimed that they would need more than 10 years for this process.

During the period of the research, 233 health care entities were at the stage of preparation for the implementation of EHR, 116 in the process of implementation, 72 were after implementation, and only 54 were already recording their documentation in an electronic form. A comparison of optimum periods of time necessary for the implementation of EHR and the stage of implementation that each health care entity is currently at is presented in Table 2.

Table 2. Time estimated by respondents for the EHR implementation versus their EHR implementation stage

Estimated time for implementation/ EHR implementation stage	0-2 years	2-5 years	Over 5 years	Total
Preparation	117	73	43	233
Implementation	26	48	42	116
Post-implementation stage	31	40	55	126
TOTAL	174	161	140	475

With the use of chi-squared test of independence, it was shown that the opinion regarding the time necessary for EHR implementation depended on the stage at which a given health care entity is currently (chi^2=45.63; p=3*10–9, α=0.05). Health care entities which already implemented medical documentation in electronic form, stated that a minimum of five years should be the optimum time frame for its introduction. Those entities which are still at the stage of preparation for the implementation are convinced that they can do it within a maximum of two years.

The most popular electronic document, kept by 48.63% of health care entities who were respondents in this research, was the admission book. Nearly half of the respondents (42.06%) already kept patient's histories in electronic form, but not all of these entities was able to issue e-referrals or medical e-certificates. What calls for attention is the very low percentage of entities which keep pregnancy history records (4.84%), or files in an electronic form on populations affected by epidemics (6.53%). The current study also analyzed the relationship between the time in operation of a given health care entity within the health care system, and the stage of implementation of EHR. The relationship between these attributes proved to be statistically significant (chi^2=22.17; p=3.5*10², α=0.05). New entities (up to five years in operation on this market) were much more efficient in implementing EHR. As much as 19.75% of these entities had already completed the implementation process, while 12.35% were in the stage of final adjustments to the system. At the same time, a large proportion of entities with long experience on the market (48.39%) were still at the stage of preparation for implementation. It was also found that the stage of EHR implementation did not correlate with the profile of conducted medical activities (chi^2=12.71 p=0.12, α=0.05) (Tab. 3). The relationship between the stage of EHR implementation and the Voivodeship in which the given health care entity is located was also analyzed. No statistically significant relationship between these attributes was been found (chi^2=20.70; p=0.65, α=0.05) (Tab. 4). This indicates a small influence of territorial division and policies of self-government units on the process of informatization of health care entities. There was, however, a relationship between the individual Voivodships and the stage of EHR implementation at health care entities. The Podkarpackie Voivodeship looked very positive in this aspect. The smallest percentage of entities which are still at the preparatory stage of implementation was been observed in this Voivodeship (37.5%), as well as the highest percentage of entities which have already completed implementation (37.5%).

Table 3. Organizational-legal form and the stage of EHR implementation

Organizational/ legal stage/ EHR implementation stage	Enterprises	Independent Public Health Care Entities	Research Institutes	Foundations	Others	TOTAL
Preparation	122	32	23	23	33	233
Implementation	70	21	7	8	10	116
Post-implementation stage	81	13	7	6	19	126
TOTAL	273	66	37	37	62	475

Table 4. Voivodeship and the stage of EHR implementation

Voivodeship	Analysis stage	System implementation	Post-implementation stage
Dolnośląskie	59.09%	22.73%	18.18%
Lubelskie	41.38%	20.69%	37.93%
Wielkopolskie	60.78%	21.57%	17.65%
Łódzkie	47.69%	20.00%	32.43%
Małopolskie	48.00%	12.00%	40.00%
Pomorskie	40.54%	27.03%	32.43%
Mazowieckie	61.76%	20.59%	17.65%
Świętokrzyskie	47.22%	30.56%	22.22%
Śląskie and Opolskie	50.00%	27.14%	22.86%
Podlaskie	42.86%	32.14%	25.00%
Podkarpackie	37.50%	25.00%	37.50%
Kujawsko-pomorskie and Warmińsko-mazurskie	53.13%	25.00%	21.88%
Zachodniopomorskie and Lubuskie	36.36%	36.36%	27.27%

DISCUSSION

'E-Health' development monitoring in European countries is systematically conducted by the European Commission, which has developed a model structure of indicators and directions for the development of countries that wish to

informatize health care. Research conducted by the European Commission in 2009 [14] showed that the average rate of electronization for Poland was 1.0, with the European average at 2.1. Regarding the possibilities of electronic recording of administrative and medical patient information, Poland received 3.7 out of 4 and 3.2 out of 3.7 points, respectively. The best scores out of all European Union countries were given to Denmark, the Netherlands and Finland (4.8 each for Denmark, 4.9 and 4.5 for the Netherlands and 5 and 4.7 for Finland). Rates lower than those of Poland were only achieved by Lithuania (1.9 and 1.0), Latvia (1.3 and 2.3) and Romania (2.3 and 2.2). Also in 2012, Poland was below the European average in all the aspects: network infrastructure, applications (e.g. EHR, telemonitoring or e-prescriptions), integration (understood as the exchange of information between the individual entities), or the safety of medical data [15].

Certainly the worst rate applied to the possibilities of medical data exchange between health care entities, which was 30% lower than the European average. On the other hand, the aspect of electronic health records at hospitals improved; currently, it is only 7% below the European standard. Also in relation to basic health care, Poland is not one of the top countries in terms of informatization – the EHR rate for Poland stood at 2.18 in 2012. The Netherlands, for example, achieved a score of 3.33. Concerning the electronic exchange of data, Poland's position is also unfavourable – 1.25 points, and Denmark scored 3.04 points. According to the report, the countries which stand out in terms of the informatization progress are Estonia, Italy, Spain and the Netherlands, among others.

Implementation of electronic health record has been already proven as a strategy for improving patient safety. In research evaluating 257 studies published between 1995 – 2004, three major benefits on quality were found: increased adherence to guideline-based care, enhanced surveillance and monitoring, and decreased medication errors [16]. The utilisation of services also decreased, which was the major efficiency benefit. Another classic study that summarises the 2005 symposium of the American Medical Informatics Association's College of Medical Informatics, described several barriers that implementers ought to address in order to increase the likelihood of success [17]. One of the major barrier was the unclear vision of the benefits of personal medical records among the health care professionals. Therefore, the implementation should not be perceived only as a technical endeavour, but in general as a big behavioural change, requiring appropriate social tools.

CONCLUSIONS

The objective of this paper was to present the starting point, progress, problems and forecasts regarding the implementation of EHR systems at Polish health care entities. It was found that most health care entities providing specialized outpatient care would not have complied with the provisions of the Act on Information System in Health Care had the deadline for implementation of EHR not been postponed until 2017. Five months prior to the initial deadline (August 2014), about 73.47% of respondents did not yet have an EHR system ready, of which 49.05% of health care entities had not even chosen a system provider. The research also shows that two years is insufficient time for the entire process of informatization of a health care entity. It is likely that most health care entities will face difficulties in keeping to the new deadline, as stipulated in the amended Act on Information System in Health Care of 31 July 2017.

Costs connected with informatization, difficulties in choosing the right software and the pressure of time imposed by the Act, make some health care entities resistant to the implementation. The IT market is also worth mentioning as it is facing the challenge of demand from more than 10,000 health care entities, from small doctor's surgeries to big hospitals.

The presented study evaluated primarily the impact of EHRs on patients, mainly taking into account their care. Although there are only a few clinical studies in this field, significant benefits were found in lowering the number of office visit rates, and increase in telephone contacts, as well as changes of the medication regime and better adherence to treatment [18]. These profits should be made more apparent in the communication on introduction of EHR, which might create more bottom-up engagement among managers and patients' associations, especially as there is evidence that chronically ill patients may improve their health status by using a patients' portal in EHR.

The research showed that EHR implementation problems are of a national nature, and not correlated with regions, nor are they connected with the type of health care services offered. The main reasons for the occurrence of problems with EHR implementation are: the maladjustment of the market, the short deadline for implementation, and the overly general character of the Act in its original form. Those entities which have been on the market for the shortest time are more optimistic about the process of informatization of the health care than the entities which have been in operation for more than five years. Already at the stage of creating a health care entity, the decision is being made to use EHR. Those health care entities which had already completed the implementation express the opinion that two years is insufficient time to complete this process. About 75% of these respondents stated that this period should be more than two years, of which about 43% suggested it should exceed five years. The pessimistic attitude toward EHR increased with the experience of an entity on the market of health care services, and the knowledge of provisions regarding information in health services.

Without appropriate legislation, clearly defined guidelines regarding informatization of individual sectors of services, it will not be possible to develop an information society in an economy-based country.

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