IMPLEMENTATION OF IT SYSTEMS IN HEALTH PROTECTION

Anna SOŁTYSIK-PIORUNKIEWICZ

Summary: The paper presents the assumptions of the strategies of implementing IT systems in the health protection sector in Poland. It contains a review of IT systems dedicated for health care centres. The author described a system of electronic medical report, taking into account governmental plans for implementing the Health Insurance Card (HIC) and pl.ID systems, as well as e-Prescription system being implemented by CSIOZ. The paper presents a few examples of systems dedicated for clinics, chemist's shops, hospitals and pharmaceutical wholesale outlets.

Keywords: IT systems in health care, KUZ, EKUZ, e-KUZ, RUM, e-RUM, pl.ID.

1. Introduction

The aim of implementing IT systems in health care in such facilities as health care centres (hospitals, clinics), chemist's shops and others, is to improve the effectiveness of spending public funds on health care. Such systems should be characterized by integration and capability of extension.

IT systems, which are used to streamline, improve the functioning of health care, are the area of interest not only in Poland [1], but also in many countries across the world and Europe, e.g. Germany [2]. The transformation, due to implementation of IT systems, into a uniform, integrated and flexible structure, is undoubtedly beneficial for the safety and comfort of patients and streamlining activities in a health care system. Benefits from implementing IT systems fulfil the expectations of both patients and health services providers, as well as improving the whole process of decision making by participants of the health care system.

Projects for implementing IT systems in health care are complex and complicated undertakings. These processes should be carried out in stages. To achieve best effects, individual stages should be implemented efficiently and consistently. Moreover, appropriate legislative changes are required and – importantly – persuading decision makers about necessity of such solutions.

Any IT systems implemented in health care must comply with legal standards in force and be adaptable to changes made to the national law. Due to the mass scale of health care, they must also be efficient.

2. Assumptions and directions of introducing IT systems in Polish health care

The directions of implementing IT systems in Polish health care are now concentrated mainly on putting into effect the assumptions of the European Commission concerning e-Health. The main issues presented in the „e-Health Poland" plan which require implementation by 2015 include the following [3]:

1. Ensuring citizens easier access to health care information.

2. Improving effectiveness of the health care system with regard to electronic flow of information.
3. Creating procedures and guidelines, gathering and giving access to good practices to improve management of a health care centre thanks to implementing information and communication systems.
4. Modernizing the system of medical information to analyze the demand for provided health services
5. Practical realization of the development of IT solutions in protection of health in line with the guidelines the European Commission which will allow the Republic of Poland to be included into the area of interoperational Electronic Health Record .

Currently, due to accepting for implementation Programmes financed from structural measures, the following activities are of key importance:

- implementation of the Programme of Health Protection Informatization
- creating the conditions for the development of health protection e-services – especially telemediacal systems (teleconsultations, telemonitoring, online patients' registration) e-prescriptions and electronic health records, which will be linked with a new identity card.

3. Review of IT systems implemented in health protection

3.1. Health insurance card

Electronic health insurance card was implemented in the Silesia voivodeship about 10 years ago as part of works connected with informatization of Silesia voivodeship department of National Health Fund. Electronic health insurance card (HIC) is used to verify insurance status of an authorized card holder in the system of Silesia voivodeship department of National Health Fund. It also provides personal data and is used for authorization of the services provided as part of performing a contract with Silesia voivodeship department of National Health Fund [4]. This card may be issued to an insured person with a PESEL national identification number who can prove his/her residence on the territory of the Silesia voivodeship.

Since 2004, it has been planned in Poland to implement country-wide Health Insurance Card modelled on the silesian card. To continue the works ordered by Health Minister on February 8, 2005, a Group was set up to draw up a strategy for the development of a medical information system in health protection and prepare a conception of implementing European Health Insurance Card and Health Insurance Card. The tasks of this group included drawing up a strategy for the development of a medical information system in health protection and preparing a conception of implementing European Health Insurance Card and Health Insurance Card. It was decided that representatives of Health Ministry would be involved in the works of a Group for developing a conception and design of electronic Health Insurance Card (e-HIC), electronic Medical Services Register (e-MSR) and programmes of their implementation, set up by order of the President of the National Health Fund No 40/2004 of 25 November 2004 for the purpose of preparing a functional conception, scope of application and design of e-HIC, linked with European Health Insurance Card, and a conception and design of a system for electronic registration and medical services monitoring (e-MSR) and programmes (strategy, plan, schedule) for implementing e-HIC and e-MSR [5]. Up to now, the implementation has not been completed.

Another proposal of implementing electronic medical report is using the function of a health insurance card in an electronic identity card as part of the implementation of the programme MSR II. This project was described in a publication on the connection between HIC and ID.pl. Its basic aim is to ensure the verification of the parties, place and sequence of a medical transaction (patient and professionals) by means of a cryptographic secret carrier. This project is based on the use of a crypto processor card (Health Insurance Card, Professional's Card) in an environment that is safe for creation of electronic signature. It is also assumed that pl.ID will constitute an electronic document which may be used for verifying a person (including limited identification), creating personal and qualified signatures, and entitles to cross the borders of the countries united by the Schengen Agreement, as well as serves the function of HIC. As a result of a decision by KRM of December 2009, the project was linked with pl.ID, in which there is a separate space for HIC [6]. Currently, the National Health Fund is developing and handing to the Ministry of the Interior and Administration the document „Technical and functional requirements for Health Insurance Card, HIC application and their environment".

The main aims of implementing such solution include [7]:

- facilitating the process of registration and confirming the right to health services (effectiveness)
- improving the reliability of accounting data sent to the National Health Fund (integrity and indisputability)
- secure access to data (confidentiality)
- increasing the chance of a rescue in emergencies
- satisfaction of the entitled, possibility of getting remote access to own data,
- increasing the effectiveness of medical centres (automation of activities),
- decreasing the number of frauds, mainly in the area of accounting for services that have not been provided,
- improving the quality of data.

Ultimately, health insurance card should be an element of the IT system of the health protection system in Poland. However, using such card entails access to sensitive data, thus one of basic requirements is ensuring security of the IT system used in medical services. It should also be able to integrate with the medical services register and medication register. It may also be an instrument for checking insurance as part of processing eHIC instead of RMUA monthly report for insured person. Electronic medical report should be integrated with IT system for chemists and health care centres as well as the electronic system of prescriptions and electronic system for medical appointment referrals.

3.2. Integrated IT systems for comprehensive service of health care centres and settlements with NHF provided by Asseco Poland SA

Depending on the needs of a healthcare provider with regard to medical services, Asseco Poland SA offers various IT systems for implementation. These are:

- InfoMedica [8],
- mMedica in versions PS, PS +, Standard and Standard + [9],
- Hipokrates,
- SolMed.

The InfoMedica system consists of several modules. These are, among others: medical systems, and administration and management systems. The medical systems include the following packages:

- Package: Hospital
- Package: Clinic Pro
- Package: Diagnostics
- Dialysis unit
- Workplace infections
- Package: Laboratory with microbiology
- Ambulance transport
- Package: eMedica portal which includes eKontrahent and ePacjent packages.

InfoMedica medical systems are installed in admission rooms, in hospital wards, in diagnostic laboratories, laboratories, in operating blocks, in doctor's surgeries and treatment rooms, in clinics and outpatient clinics, in hospital chemists and medical statistic departments. They enable an efficient gathering and distribution of all medical information connected with the history of treatment of each patient, from his/her admission to the hospital until the treatment is finished. They help doctors to assess a patient's health condition, make it easier to access the data on the health condition of each patient being treated, print all forms used in the treatment process, ensure obligatory statistical reporting for the NHF as well as medical statistics institutions and centres. They streamline the organization of treatment process. The dedicated Przychodnia Pro package supports the work of medium-sized and large out-patient health care centres. It has got modules to be installed at reception desks and in doctor's surgeries. It offers specialized functionalities dedicated for supporting occupational medicine surgeries, dentist's surgeries, and rehabilitation centres. Due to full integration, doctors have access in their surgeries to a patient's whole medical documentation, including the history of hospitalization as well as examinations and medical procedures carried out [10].

The administration and management systems include the following packages:
- Package: finances and accounting
- Package: Treatment Costs Bill
- Package: Sale Service
- Package: Budgeting - Controlling
- Package: Managing the trade of medicine and materials
- Package: Managing Fixed Assets
- Package: Human Resources and Payroll Service

The administration and management systems of the InfoMedica package are responsible for gathering and processing all information connected with economic events in a hospital. They are installed in accounting department, Human Resources department, salary calculation, and other departments of a hospital's administration. They are used to maintain comprehensive bookkeeping, manage finances, carry out management accounting, prepare price lists of medical services and offers for, among others, the NHF, and other health care payers, develop plans for the sale of medical services, monitor contracts and agreements, and receipts from their fulfilment, maintain a detailed costing of current activity, calculate costs of patients' treatment, perform economic predictions. All the applications of the InfoMedica package are integrated with each other so as to ensure a flow of information between relevant organizational units of a hospital in which IT system was implemented [11].

3.3. The system of electronic prescription e-Prescription

The e-Prescription system is one of the first projects of building a modern IT system in health protection. It is being implemented under the project „Electronic Platform for Gathering, Analysing and Sharing digital resources about medical events", which is part of the country-wide Programme for Health Protection Informatization. The entity responsible for implementing the electronic prescription system is Centrum Systemów Informacyjnych Ochrony Zdrowia (CSIOZ), set up by the Health Minister. All the information gathered in the e-Prescription system is protected in accordance with security standards in force. The information in the e-Prescription system is exchanged using encrypted SSL protocol (Secure Sockets Layer), which is a widely used data transmission standard. This allows for the communication in the e-Prescription system to take place only between entitled participants of the prototype and an unauthorized access to data is prevented. Moreover, cryptographic techniques are used to verify and ensure information consistency [12].

The e-Prescription system allows electronic prescription to function parallel with its formal counterpart in the form of a paper prescription. The use of electronic prescription along with a paper prescription does not disturb the existing model of prescriptions circulation which is based only on paper prescriptions. Currently, due to the lack of appropriate regulations regarding the functioning of prescriptions only in an electronic form, an electronic document does not constitute a prescription in the light of law.

Writing a prescription in an electronic form takes place by means of a doctor's medical computer program, and in the case when a doctor does not have an internal software in his/her surgery, communication with the e-Prescription system occurs through an on-line application.

Pharmacists work with the e-Prescription system directly through their chemist's program, and can also dispense electronic prescriptions through a dedicated on-line application.

Patients get access to information about the history of their pharmacotherapy through the e-Prescription Internet Account.

The prototype of the e-Prescription system was launched in mid-March 2011, but the actual processing of prescriptions using this system started on 18 April 2011. The delays were connected with the need to install and launch the system in the entities that signed a cooperation agreement with Centrum Systemów Informacyjnych Ochrony Zdrowia, and necessity of providing training to medical personnel and pharmacists on how to operate the system.

Currently, the e-Prescription system supports 20 facilities, i.e. 2 clinics, 2 doctor's surgeries and 16 chemist's shops. This implementation can be regarded as a pilot implementation across the country [13]. However, for the system to be successfully implemented across the whole country, electronic prescription should be regulated by new legal regulations, and in the whole country there should be access to the public database of medicines, patient's insurance card and a tool for doctors authentication.

Fig. 1. Examples of certified medical readers
Source: [7]

3.4. Systems for chemist's shops and clinics provided by Kamsoft SA

One of the companies which provide IT systems for health protection sector is Kamsoft SA based in Katowice. The company is developing a lot of projects in medicine and pharmacy, from systems for supporting hospitals (KS-MEDIS), clinics (KS-SOMED) or dentist's clinics (KS-KST), through data security systems in medicine and pharmacy (KS-BDO) and a database of medicine and health protection means (KS-BLOZ), to national system of health protection (NSHP). The company also implements systems supporting chemist's shops: Integrated System for Managing a Network of Chemist's Shops (KS-ZSA) and IT System for Supporting the Handling of a Chemist's Shop (KS-AOW) and systems for pharmaceutical wholesale outlets (KS-EWD).

The Integrated IT System for Servicing a Clinic (KS-SOMED) is a multi-module tool for supporting the work of medium-sized and large specialist clinics. The system is characterized by an extended functionality which enables the processing of the most important organizational issues:

- managing doctor's appointments schedule
- gathering of medical data
- handling of financial settlements with payers.

The NHPS portal (National Health Protection System) is a free of charge educational and informational platform for all representatives of the health protection market and patients. It enables communication between a patient, doctor and pharmacist, the use of various health services and access to preventive health programs. The central element of the NHPS system is patient and his/her family. Each patient is represented in the system by an Individual Health Account. The Patient Service enables performing various operations on the health account. The include viewing data gathered in the system and entering certain information by a patient himself. This information may be subsequently used by doctors and medical personnel to have a better knowledge about patient's health, and thus it may lead to providing the patient with a better health protection [14].

The Electronic Data Exchange system (KS-EWD) enables direct communication between a chemist's shop and a wholesale outlet by means of the Internet. The unique features include interactive checking availability of goods in a wholesale outlet, together with the option of immediate ordering of the goods on special offer. Due to integration of the KS-AOW and KS-EWD systems, the system designed for chemist's shops includes features ensuring data exchange between a chemist's shop and a wholesale outlet.

The IT System for Supporting the Handling of a Chemist's Shop (KS-AOW) is a comprehensive system for supporting the work of chemist's shops, working under the Windows environment. In its work, the system uses SQL databases and Internet technologies. Particular emphasis was placed in the system on an efficient and fast operation. Also, the solutions applied in the system allow to use needle printers and their work with the system in a character mode. The KS-AOW system consists of a dozen interrelated modules, which ensure a wide range of possibilities. The features included in the modules comprising the System allow to check sale, orders and purchases, manage the warehouse, create lists, analyses and perform accounting. The KS-AOW system complies with the regulations of the Health Ministry, Finance Ministry, National Health Fund and other entitled institutions and is constantly modernized and adapted to changing regulations.

Fig. 2. Demonstrative version of KS-AOW 2012.01
Source: [15]

Integrated System for Managing a Network of Chemist's Shops (KS-ZSA) is a comprehensive system supporting monitoring and managing the work of a network of chemist's shops, working under the Windows environment. The central management of chemist's shops enables an optimal warehouse management, rationalization of purchases and a better use of the economies of scale during purchases. The system consists of a dozen interrelated modules which ensure a wide range of possibilities. The features included in the modules allow to place orders and make purchases, manage the warehouse, create lists, analyses as well as accounting for individual chemist's shops. Management of chemist's shops, by analysis and purchase specialist, supported by the KS ZSA system, allows to

relieve the staff of chemist's shops of many tasks and use the time saved for increasing professionalism of patient care and assistance – which is a more and more important element of competing on the pharmaceutical market [15].

5. Conclusions

The assumptions of the strategy of implementing IT systems in health protection in Poland focus on achieving a satisfactory level of informatization in the basic areas of the health protection system. So far, we haven't succeeded in implementing a single system that would be without data redundancies and would be coherent, both for patients and health care centres:

- certain data redundancy – similar data is stored in different registers, kept by two different entities, e.g. Central List of Insured Persons and Central Register of Insured Persons (NHF and Health Insurance Company),
- incoherence of data between different registers – the same data in different registers may vary (e.g. change of address is not automatically updated in all registers in which the address appeared),
- lack of cooperation with reference registers – generally, registers do not refer to base reference registers (PESEL, TERYT, KRS),
- lack of cooperation between registers in health protection – registers in health protection do not use source information which already exists in other health protection registers,
- lack of a uniform data model – registers and databases in health protection do not use a uniform data model,
- lack of structure and relationships between registers in health protection [3].

Currently, newer and newer systems for chemist's shops are being implemented, i.e. EuroMedica [16], based on modern Internet technologies. Clinics implement InfoMedica or OSOZ systems. However, it seems necessary to implement such IT systems in health protection which will ensure:

1. Creation of information conditions that will allow to take long-term optimal decisions in health policy, irrespective of the adopted organizational model of health protection and principles of financing it.
2. Creation of a stable information system in health protection, characterized by a flexible approach to the organization of the system of health protection resources, including a model of financing services from public funds, and a resilience to disturbance in data gathering and archiving, caused by system changes in health protection.
3. Decreasing the information gap in the health protection sector, that makes it impossible to built an optimal model of health protection.
4. Organizing an existing system for information gathering, processing and analysing (e.g. in Business Intelligence systems)
5. Building a system ensuring electronic communication and possibility of exchanging documents and reports between health protection entities and the proprietary body [3, 17].

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Dr inż. Anna SOŁTYSIK-PIORUNKIEWICZ
Wydział Informatyki i Komunikacji, Katedra Informatyki
Uniwersytet Ekonomiczny w Katowicach
40-287 Katowice, ul. 1 maja 50
tel./fax: (0-32) 257 72 77
e-mail: anna.soltysik-piorunkiewicz@ue.katowice.pl