О.Чабан, О.Бойко
Lviv national medical University

named after Danylo Galyts'kyi

REVIEW OF WORLD PRACTICES FOR THE IMPLEMENTATION OF MEDICAL INFORMATION SYSTEMS AND PROBLEMS OF CREATING A SINGLE MEDICAL INFORMATION SPACE

The current state of health information systems in Ukraine and abroad is considered. The problems of creating the unified medical information space are investigated and analyzed.

Keywords - health information systems, medical information space

Introduction

Effective information support of medicine is one of the important preconditions of its quality at all stages, from initial examination in the clinic and specialist care in specialized institutions to provide telemedicine consultations. Medical information is becoming more complex and, simultaneously, more important. Today Informatization of healthcare primarily means the use of information technology, with which it is possible to provide fast and targeted information. Range of tasks that are related to Informatization, is very broad and includes also information with the purpose of decision making, the provision of medical care, training, research and administrative requests, and the like. Among this broad range of important area should be considered Informatization of medical-diagnostic process by implementation of the medical information systems (MIS).

Statement of the problem

Today there is a huge amount of medical information systems, only the list reaches tens. At the same time, until recently, not solved the issues of standardization MONTHS, in particular the creation of a common terminological approaches. This is connected, primarily, with the diversity and evolutionary nature of medical data and the difficulty of bringing them to a rigid template form. Still no single medical information space even in developed countries, because the question of standardization of medical data.

The purpose of work

The aim of this work is to compare the present state of implementation of the IIA in Ukraine and abroad and to explore the problem of creating a single medical information space. It is necessary to focus on the search of conceptual solutions to the problems of standardization of medical information and the application of common approaches in implementation of health information systems.

The study of the experience of developed countries

One of the important advantages of use of information technologies is the ability of the computer analysis of large datasets. The ability of the health information system to provide data analysis and scientific research is one of the main criteria of its perfection. Developed countries (USA, Europe, Japan, Canada, Australia) for many years have complex (at the level of the whole country) program of Informatization of their health systems. Основна ідея таких програм - інтеграція в кінцевому рахунку усіх їх складових (ІС окремих медичних закладів, а далі міських, районних та регіональних - Регіональних Медичних Інформаційних Мереж - RHINs, Регіональні медичні Відомості Організацій - RHIOs, Регіональних Медичних Інформаційних Систем Управління - RHIMSs) в єдину ІС всієї системи охорони здоров'я країни, так звану Національну Інформаційну Інфраструктуру охорони здоров'я (National Health Information Infrastructure - NHII), або Національну Інформаційну Мережу охорони здоров'я (National Health Information Network - NHIN). Successful precedents of such

MONTH in the world yet not very much, because this task is extremely difficult not only technical but also organizational, and financial point of view, not to mention the complexity of MONTHS in the entire country. A characteristic example is the UK, where in 2002 started a large-scale national project for the collection and exchange of health information. Recently widely discussed the problems that have emerged during the implementation of this project, and even the possibility of its closing. The project has already cost the English taxpayer in the amount close to 20 billion dollars (14 billion pounds). The initial term of completion - 2010 - now postponed to 2015, and many experts doubt and in this period. In addition, in the framework of this project implemented a national e-staffing system for health care workers England, which provides a single centralized personnel accounting and payroll services to more than 1.3 million physicians. System cost about $ 100 million. This suggests that the problem is in the specifics of medical information, because Informatization of the Finance industry has advanced much further than medical. Despite this, the number of projects in the sphere of Information Technologies of the health Information Technologies - HIT) in the world every year is increasing.

In recent years the industry development and implementation of IP medical institutions in the world was a big evolution. In the early 1970-ies functioned hospital information systems (Hospital Information Systems - HISs), which were very expensive and therefore they could afford only the largest and most solvent medical institutions (primarily large hospitals - hence the name). Such IP worked on large computers, the so-called mainframes or mini-computers (mainfraimes and mini-computers. In 1980-ies appeared IP cheaper platforms, the so-called workstations (workstations), distributed (distributed) architectures that have used technology LANs (Local Area Networks - LANs) and was designed as subsystems and modules.

And only in 90th years, and particularly since the onset of the 21st century, thanks to the introduction of personal computers, technology of database management systems (DBMS), architecture "client-server communication technologies, using local, global, wireless, and web and a variety of web technologies - Informatization in medicine approached a modern, integrated information systems, including various subsystems, and modules.

Modern IP in the U.S. and other developed countries - large (sometimes in the scale of whole regions), are heterogeneous in their structure (which include IP, or subsystems of different hardware platforms, communications technology and software solutions), oriented on modern medical standards and standards in the sphere of information technologies, are quite complex business logic system groups.

European organization and the Commission on ICT, which aim is to unite all national information network of health of the EU countries, and to provide for the population of these countries the effect of a standardized electronic health card (EHR) systems throughout the European Union, implement, together with the national programs of the single European e-health, which performs such priority tasks as standardisation, the provision of insurance coverage, regardless of location, processing of medical information about the patient with use of information technologies. The volume of investments in the European Union's framework program e-health without taking into account relevant national programmes already amounted to hundreds of millions of euros [4].

Because the health care industry has a tendency to change, and health data are the most valuable that is stored in the medical institution, the IP should be constructed so that any modification of any of its parts does not lead to data loss and reflection on (not hindered work of medical workers in performing their official duties. Can be replaced communication, hardware or software system parts, but for the end user (doctor, nurse practitioner, or Manager) such changes should not be visible and should not affect their daily work with the medical data of patients, which have accumulated for many years or decades.

It is very important to design IP in accordance with the existing in modern sphere of ICT, hardware and software standards and protocols to ensure that in the future, first - compatible IP different levels for their unification into a single IP whole country, and secondly - reduce costs when replacing any parts of the system, when the need arises.

Driven far incomplete list of standards bodies and major information technology standards in the sphere of health protection:
• CCOW - Clinical Object Context Workgroup

- CCR - Continuity of Care Record
- CEN - European Committee for standardization
- DICOM Protocol for the interchange of digital imaging and communication in medicine
- EDIFACT electronic data Interchange for administration, Commerce and transport
- HL7 Standard of health information exchange, versa and version 3
- HL7 CDA - HL7 Structure of medicinahumana
- ICD-10 - international classification of diseases
- ICPC - international classification of primary care
- IEEE - Institute of electrical and electronics engineering
- IHE - Association of enterprises of public health
- ISO OID - ISO Object ID
- ISO / TC Technical Committee 215
- LOINC - Names and codes of laboratory tests
- NCSP - NOMESCO Classification of surgical procedures
- OpenEHR - Electronic medical record
- PKI - public key Infrastructure
- SNOMED - Systematized Nomenclature of Medicine.

Today is also actively working on establishing common international standards in the field of storage, sharing and prompt access to medical data. Already adopted ISO 13606-1:2008 Health informatics. Electronic health record communication. Part 1: Reference model - the standard model of the transmission of electronic medical records (records). Discussions are still four parts of this standard: ISO/DIS 13606-2 Archetype interchange specification, ISO/DIS 13606-3 Reference archetypes term and lists, ISO/NP TS 13606-4 Title missing, ISO/CD 13606-5 Interface specification. There is an active work on standardization personal machine carriers of medical data (smart cards, and the like). Basic requirements that provide information compatibility of these devices, expressed in international standard ISO 21549:2004 Health informatics. Patient healthcard data. Part 1: General structure, Part 2: Common objects, Part 3: Limited clinical data Part 4:Extended clinical data, FDIS Part 5: Identification data, FDIS Part 6: Administrative data, ISO 21549-7:2007 xanax data. So, the health information system should also provide for the exchange of confidential information with use of modern means of telecommunications.

As an example of such a system that accumulates modern approaches and standards for the planning of the IP, you can lead the project STRIDE (Stanford Translational Research Integrated Database Environment, the aim of which is the creation of a unified Central Bank of the biological and medical data that are used by physicians and researchers at Stanford University medical center (Stanford University Medical Center - SUMC), and clinics and laboratories, which are the base for its medical school [5]. The project is based on the currently existing standards of modern it.

Основною базою проекту є центр клінічної інформатики (Стенфордський Центр Клінічної інформатики), який відноситься до офісу інформаційних ресурсів та технологій (управління Інформаційних Ресурсів та Технологій - IRT) медичної школи Стенфордського університету (Stanford University School of Medicine).

Виходячи з перспективи розвитку технологій та стандартів, основною платформою системи управління базою даних (СУБД) проекту євро СУБД Oracle 10G, яка євро стандартом де-факто в СУБД світі. Модель даних проекту базується на базі стандарту Health Level Seven (HL7), який про есть'об'єктно-орієнтованою моделлю медико-біологічної інформації, розробленою для цілей підтримки спрощеного обміну даними між різними ІС. В якості внутрішньої семантичної моделі представлення медико-біологічних даних в проекті КРОКУ використовується стандарт SNOMED КТ, а також система Уніфікованої медичної мови Національної медичної бібліотеки США (National Library of Medicine Єдиної Системи Медичного Мови - UMLS), які таким чином забезпечують семантичну сумісність з місцевими та національними базами даних, включаючи Електронну картку здоров'я Стенфордського медичного центру (SUMC s Electronic Health Record).

STRIDE is visokoetazhni and protected environment. Applied software project STRIDE is myplatform and provide end-user access to the services of a 3-level infrastructures, using hard

authorization, and encryption access (SSL SSL encryption with strong authentication). In the project are widely used XML for representing structured metadata and distributed database technology using enterprise java beans - EJB for secure remote communication between client and server, and GUI components Swing, which provide a wide selection of widgets and work on the cutting edge with images and graphics.

The study of the practice of implementation of the IIA in Ukraine

On the territory of CIS countries in the last years the process of Informatization in the sphere of health. One of the directions of joint activities of the States - participants of CIS in the strategy of cooperation of the States - participants of the CIS in the sphere of Informatization, approved by the Council of heads of governments of the CIS on 24 November 2006, determined the development of «e-health» and, above all, the creation of compatible national telemedicine systems.

But since all countries of the former USSR are in the state of reforms of the Soviet system of health care, to systematize the process extremely difficult. It is quite clear that while the country's health care system will not take decorated and clear features, which provided her with the legislative and Executive orders and acts, to speak about a serious precedents in the field of automation of medicine is very difficult. In Russia, for example, from 2002 not only adoption of appropriate laws, but also is a real health reform with the introduction of mandatory state health insurance for the whole population, as well as voluntary private for applicants. Adopted and are appropriate scale program of Informatization in large cities, regions and the whole country [1,7], on its territory are already active foreign firms-developers of IP for medical institutions that implement regional projects, and also operates a large number of domestic, Russian companies that specialize in this area.

In the field of scientific developments in the field of IP in Russia it should be noted Research Center of medical Informatics of the Institute of program systems of Russian Academy of Sciences, who developed and already many years implementing the health information system (MIS) in Russian medical institutions (hospitals) according to their technology "interim".

In Ukraine, too, is a lot of work in the direction of Informatization in the sphere of healthcare: passed the relevant state regulations, and programs. The project of Conception of quality management of medical care in the field of health protection of Ukraine for the period till 2020, the Proposed project is developed according to the decree of the President of Ukraine of April 27 # 504/2011 "On the National action plan for 2011 on the implementation of an economic reform Program for 2010 - 2014 "Rich society, competitive economy, effective government". There are a professional Association, which cooperate with similar European and world organizations [8]developed and implemented an IP-level health-care facility.

The market of it-technologies in Ukraine full enough, there are a large number of companies in the production of IP, but most of these suppliers is very small companies. Moreover, between these companies is practically no cooperation or coordination. In order to make possible the integration of such systems, they must be created using standard interfaces for information exchange, such as HL7. In addition, despite the availability of skilled software solutions, in Ukraine there is no practical experience of full transition to electronic storage and processing information in a medical institution [3,8]. Then, during the implementation of the medical information systems of the special urgency is got a number of problematic issues, which can be divided into several groups:

- our in-legal framework does not ensure an adequate level of legal protection of medical workers, applying information technologies in daily practice;

- financial resources of most health facilities can't afford them to acquire a sufficient number of expensive computer equipment and software for complex automation. Therefore, this process is successful only in certain, often far from the medical direction, departments of medical institutions: statistics, accounting, automation of administrative management, and so on;

- in Ukraine there is almost no school that would train high-level professionals in the field of development and introduction of complex health information systems. For the formation of a national school in this area creative teams need to share insights and thoughts in the development of software

products, thereby accumulating special knowledge and forming potentially profitable areas in search of effective development and implementation of the integrated IP;

- also, there are many, about 500 different medical forms used in Ukraine, such as the f-003 for in-patient treatment and f-066 for statistical accounting. Special attention deserves the form f-003, because it contains a lot of information that must be stored in electronic medical record (EHR), for example about the medicines, laboratory test results and medical records. These forms were «inherited» and they are used mainly for statistical accounting. The main problem of these forms is that they should be filled in and submitted manually (forms created in electronic form are not accepted). About 40% of the time is spent on physician fill out these forms. Also, the value of many of these forms is quite doubtful, since they are primarily used for statistical treatment. If it is, then these forms (and statistical information in them)must be filled out and processed in electronic form.

At the moment, for solution of issues associated with the implementation of information technologies in medicine, there are a number of developments, which allows solving the most pressing problems of practical medicine within the existing health infrastructure and limited funding. In the current circumstances is it possible to use local projects on Informatization of medicine, and for a more global application required, is compliance with the uniform requirements based on the application of global standards for the collection, storage, processing and exchange of electronic version of medical information.

Conclusion

Ukraine has huge scientific and personnel potential in the field of computer technologies. At the same time, chaotic Informatization of medical institutions, the lack of industry standards and software licensing uniform requirements regarding volumes and formats of information storage, unified forms of statistical reporting does not allow today to ensure the consistency, completeness and consistency of information industry. In turn, planned in the future, the transition to the compulsory medical insurance will lead to the necessity of providing insurance companies primary medical data about the patient's disease and the use of prescription medications, thereby stimulate the growth of the information reporting and, in fact, will make it impossible any institution in a manual mode.

Informatization of health care is only a question of time and, of course, considerable investments. Besides, it is necessary to create conditions and to ensure participation in international grants for specialists in the field of Informatization of health care, in particular for the development and implementation of IP OS, but while such precedents are very few or no. In General, the development of it for health may be one of the important factors that could push the Ukrainian medicine, in real reform and evolution in the direction of improving the health and delivery of quality medical services to the population.

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