DEVELOPMENT OF INFORMATIONAL-COMMUNICATIVE SYSTEM, CREATED TO IMPROVE MEDICAL HELP FOR FAMILY MEDICINE DOCTORS

OPRACOWANIE INFORMACYJNO-KOMUNIKACYJNEGO SYSTEMU MAJĄCEGO NA CELU USPRAWNIENIE PRACY LEKARZY PODSTAWOWEJ OPIEKI ZDROWOTNEJ

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ABSTRACT

Introduction: Today mobile health`s protection service has no concrete meaning. As an research object it was called mHealth and named by Global observatory of electronic health`s protection as "Doctor and social health practice that can be supported by any mobile units (mobile phones or smartphones), units for patient`s health control, personal computers and other units of non-wired communication". An active usage of SMS in programs for patients` cure regimen keeping was quiet predictable. Mobile and electronic units only begin their development in medical sphere. Thus, to solve all health`s protection system reformation problems a special memorandum about cooperation in creating E-Health system in Ukraine was signed.

The aim: Development of ICS for monitoring and non-infection ill patients` informing system optimization as a first level of medical help.

Materials and methods: During research, we used systematical approach, meta-analysis, informational-analytical systems` schemes projection, expositive modeling. Developing the backend (server part of the site), we used next technologies: 1) the Apache web server; 2) programming language PHP; 3) Yii 2 PHP Framework. In the frontend developing were used the following technologies (client part of the site): 1) Bootstrap 3; 2) Vue JS Framework.

Results and conclusions: Created duo-channel system "doctor-patient" and "patient-doctor" will allow usual doctors of family medicine (DFM) take the interactive dispensary cure and avoid uncontrolled illness progress. Doctor will monitor basic physical data of patient`s health and curing process. The main goal is to create automatic system to allow doctor regularly write periodical or non-periodical notifications, get patients` questioning answers and spread information between doctor and patient; that will optimize work of DFMs.

KEY WORDS: ICS, duo-channel connection, medical help quality, chronic non-infection maladies, DFM

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INTRODUCTION

Progress and development of informational-communicative system (ICS) that can be seen during last decade, can make qualitative changes in many humane life spheres. Informatisation is often understood as synonym for XXI century. Recent years are full of such notions as "internet society" or "internet service". Health protection as a social sphere also actively takes part in informatisation. Internet service takes more and more new medical spheres: prophylaxis, rehabilitation, epidemiological analyses, expert analyses and ruling of medical-organizational services (like distance-checking patients in consultation centers, keeping electronic medical cards or medical-social registers) [1].

Today mobile health`s protection service has no concrete meaning. As an research object it was called mHealth and named by Global observatory of electronic health`s protection as "Doctor and social health practice that can be supported by any mobile units (mobile phones or smartphones), units for patient`s health control, personal computers and other units of non-wired communication". An active usage of SMS in programs for patients` cure regimen keeping was quiet predictable. Mobile and electronic units only begin their development in medical sphere. Thus, to solve all health`s protection system reformation problems a special memorandum about cooperation in creating E-Health system in Ukraine was signed. [2].

WHO claims that development, successful application and using of electronic health`s protection program is based on 5 main subjects: monitoring, creation of electronic medical documentation, analysis of tendency and ways of development with further result publication to inform patients, who will understand it better. In case of strategically and systematically well done application electronic health protection system can cause a revolution in all health`s protection sphere, by supplying all patients, who use mobile phones or other gadgets, with medical information and on-line help. Such type of medical service has great advantages, especially for patients, who live in far or hard-accessible regions and will not get a medical help in other way [2].

Researching and development of mHealth services and additions became one of the most important subject among scientific society. mHealth now is used for monitoring, prophylaxis and diagnostics of maladies[3].

Development of Internet medical registry social system has a lot of advantages for health`s protection system, for example, lower and more effective management of great

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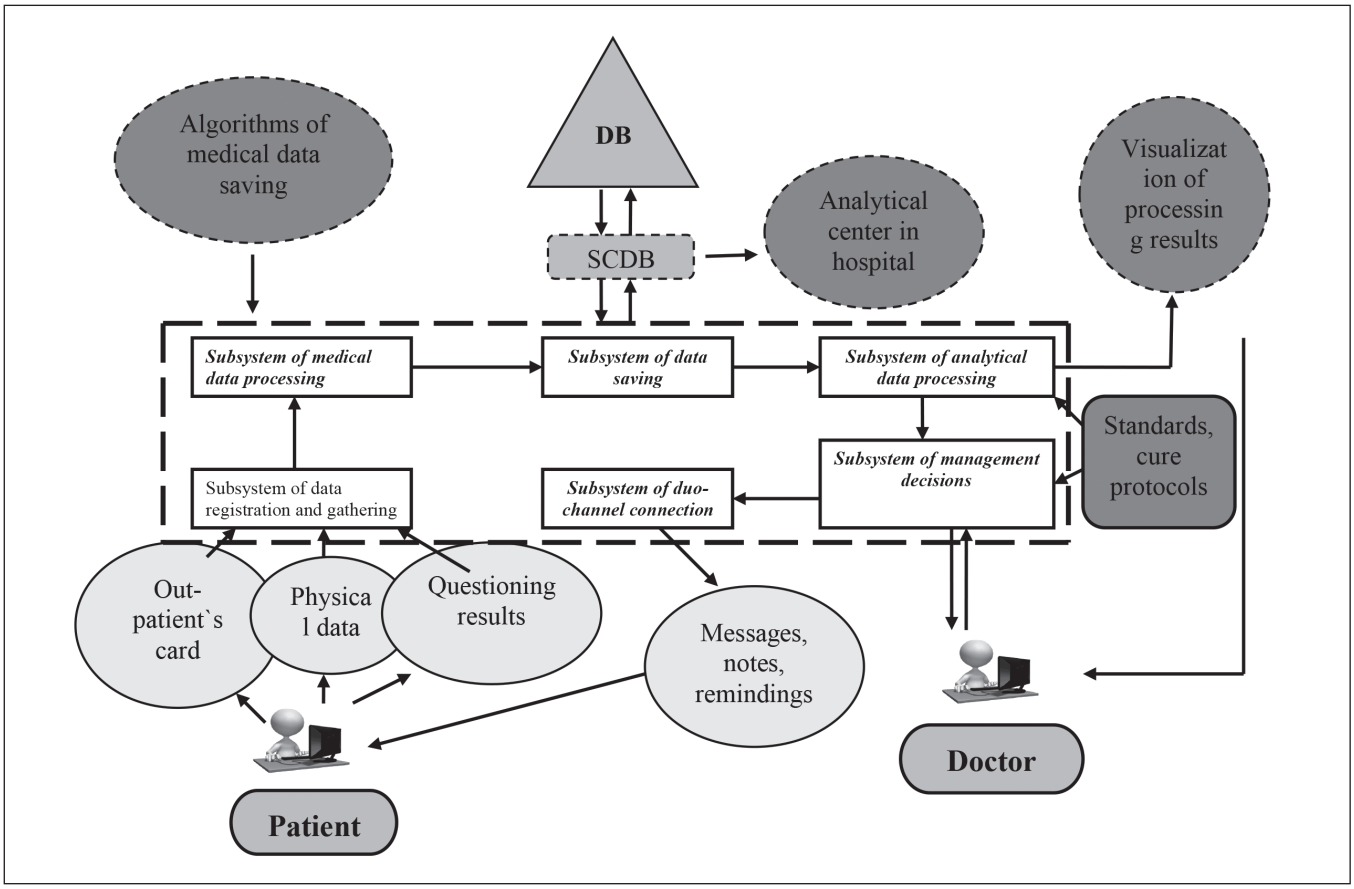

Pic. 1. Component structure of ICS

amount of patients` information and centralization of their medical data [4].

In low-developed countries we see high interest for capitalization of wide medical electronic internet system for development of medical information-searching services that then may make better medical monitoring and patients` consultations. We have got proved facts that claim this system usage can really help to avoid such problems as lack of specialists, not high qualification, or/and non-conformity to patient needs, price of service and transport, lack of proved information sources [5].

An active usage of SMS in programs for patients` cure regimen keeping was quiet predictable. This cheap or free service helps sending messages, so patients have no extra-need of a live talk. Doctor can oversee all messages to get the picture of patient`s state. In such way mobile health`s protection units can save humane life, low a number of illness cases and lack of working capacity and low medical service expenses for patients with chronic non-infection maladies because main part of medical expenses in low-developed and developing countries are based on such patients [6, 7].

However, non-infection maladies are one of the main causes of high mortality rate. Among 57 million registered deaths, non-infection maladies cause at least 36 million, including 14 million at the age 30-70 years [8].

Mobile and electronic units only begin their development in medical sphere. Thus, to solve all health`s protection system reformation problems a special memorandum about cooperation in creating E-Health system in Ukraine was signed. We have created and took into application a special system of e-reminder for patients with arterial hypertension that had already proved it`s medical, social and financial effectiveness on regional level [9].

Nevertheless, we have no fully done system of connection with dispensary patients viz. duo-channel system of DFM-patient communication to attend patient during their dispensary cure.

THE AIM

Development of ICS for monitoring and non-infection ill patients` informing system optimization as a first level of medical help.

MATERIALS AND METHODS

During research, we used systematical approach, meta-analysis, informational-analytical systems` schemes projection, expositive modeling.

Developing the backend (server part of the site), we used next technologies: 1) the Apache web server; 2) programming language PHP; 3) Yii 2 PHP Framework.

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Results and discussion

ICS developed by us as a type of first level medical help today is one of vital options for modern high-quality medical service.

ICS today is a collection of organizing and technical units for information saving and exchange. It`s main operations include (Pic. 1):

- Registration of patients and medical information collecting;
- Data processing;
- Data saving;
- Analytical data processing;
- Taking management decisions;
- Subsystem of duo-channel connection.

The ICS subjective and objective patient's state, anamnesis and diseases` data are taken from "Out-patient's cards" (registration form № 025/o). Physical data are sent from questioning results that are sent before to each patient personally. Diagnosis and passport data are taken from registration form №025/o; such information as: purpose and number of visits to DFM and specialists, information about dispensary examination, number of additional analyses (laboratorial or instrumental) and their results, prescribed cure, number of exacerbation, ambulance calling and hospitalization, is gathered. Each doctor has to take an inner audit, using questioning, to get information about full medical information of any patient, his/her attitude to health`s state self-control, risk factors, keeping healthy way of live and prescribed cure. Taking all this into account, doctor can monitor, analyze and compare all data to make further management decisions.

The ICS also has to protect medical confidentiality and personal data, and doctor gets an agreement to get and work with this information. All information is confidential, each patient, registered in this system, has access only to his/her personal page and information about his/her disease but has an ability to correct information. During creation of informational system (IS) and database (DB) we kept system ability to widen to change and add information during cure. And after such operations any program code has not to be changed.

Gathered information is analyzed and processed using algorithms of previous processing and saving of medical data. Then all information is saved by system of control of database (SCDB) and then goes into subsystem of analytical processing that archives medical data, their protection from unauthorised access and visualization of processing results in a form of diagrams and graphics. Thus, doctor has a possibility to do the analytical processing of given information about any patient`s dispensarisation, to analyze questioning results, health state examinations, etc. In the end, all generalized information is sent to the analytical center to some concrete hospital to be then accumulated and analyzed by specialists of some department or ward.

Among other tasks, presented in this program, we have reception and sending of messages by addressees, and saving of this information in database (DB). Users can access their personal page after passing the special authorization (registration). Unauthorized users are readdressed to the first start page. Doctors` and patients` data are saved separately in database. After some processing and query routing the program will renew information about user`s last site activity to show his/her status: off- or on-line. Each user starts in program new caching of all information and the program fixes the time of last user`s activity on the site, that helps to value ICS productivity.

For bigger comfort and simplicity of using of subsystems of processing, registration and data saving, and duo-channel connection, we created a special addition with screen form, at the start page of which one can see a basic information about patient (passport data and diagnosis) and information about general health state, based on the physical data. On the upper panel of personal page patient can find such elements as function "reminding" that shows recent and upcoming questioning and examinations and function "incoming messages" and button to be out of personal page. All incoming messages are saved in DB. During message sending system checks all possible addressees, because only concrete patient can send a message to concrete doctor and vice versa. Depending on whether patient/doctor is on-line, messages are either coming to him/her directly or saved in cache memory. And if user is on-line but not in a chat, he/she will be notified about new messages.

Created duo-channel subsystem allows doctor to make an active dispensary monitoring of patient and to avoid unexpected disease`s progress by dynamic monitoring of main physical data of patient, his/her live regime and cure. This sytem allows sending periodical or non-periodical messages-notifications about some recommendations and prescribing to health self-control (taking blood pressure, or glucose-level in blood, keeping of healthy lifestyle and cure process or necessity of real-time visit to DFM) to single patient or patients' group. These notifications are can be not answered on, but doctor can see whether patient had seen them or not. Other group of messages contains questions (about health state) that have to be answered in real-time after sending. After getting, analyzing, processing of information doctor gets results and decides, if it is necessary, to visit patient, to call him/her for an examination, to call an ambulance, or to make a hospitalization. Logically, patient gets a message with commands for the mentioned deeds. In the case on need, patients can consult doctor on-line. All information is generalized and saved in DB.

Duo-channel connection of ICS allows not only monitor health state of patient, react on it`s changing, but also enlist patients for them can self-control their physical state, keeping healthy way of life and medical prescriptions.

In Ukraine presented ICS technologies are only developing. Our ICS allows all hospitals modernize the monitoring system as a first type of aid in the first level. Moreover, we have to admit that new program is very comfortable for all new Internet-users, like doctors and patients both: for them we have created comfortable and understandable interface, program is settled and prepared simply and each user can freely operate with additions. This software helps to send all messages to all patients of different age categories quickly.

We concider, mentioned method of distance communication with using of modern communication units makes cure effectiveness higher, decreases expenses of both doctor and patient and in general increases quality of medical help with non-infection maladies.

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CONCLUSIONS

1. ICS is a gathering of organization and technical units for saving and processing of information that allows take interactive dispensary cure and quickly send messages-notifications to wide circle of patients.
2. Regular duo-channel connection helps patients improve self-control, make patients more responsible for their health and keep healthy lifestyle and medical prescriptions.
3. Developing of this program helps decrease the amount of work and optimize it for DFMs, improve quality of first medical help.
4. New program is very comfortable for all new Internet-users, like doctors and patients both: for them we have created comfortable and understandable interface, program is settled and prepared simply and each user can freely operate with additions.

REFERENCES

1. Levanov V. From telemedicine to e-health: the evolution of terms. Medical alnames. 2012;2(21):16–19.
2. mHealth New horizons for health through mobile technologies. Report on the results of the Second Global eHealth Survey. Series «Global Observatory on e-Health». World Health Organization. 2013; 3: 102.
3. Fleming N, Becker E, Culler S, Cheng D, McCorkle R, Graca B, Ballard D. The impact of electronic health records on workflow and financial measures in primary care practices. Health Services Research. 2014 Feb; 49(1 Pt 2):405–420.
4. Martínez-Pérez B, de la Torre-Díez I, López-Coronado M, HerrerosGonzález J. Mobile apps in cardiology: review. JMIR Mhealth Uhealth. 2013 Jul 24;1(2):15. doi:10.2196/mhealth.2737.
5. Ivatury G, Moore J, Bloch A. A Doctor in Your Pocket: Health Hotlines in Developing Countries. Innovations: Technology, Governance, Globalization. 2009;4(1):119–153.
6. American Medical Association. Department of Health and Human Services – Centers for Medicare and Medicaid Services. Chronic care management services. 2016.
7. Demidov A. Information technology for mobile healthcare. Questions of the organization and informatization of public health services. 2013;1:53–60.
8. Källander K, Tibenderana K, Akpogheneta J, Strachan L, Hill Z, H. ten Asbroek A, Conteh L, Kirkwood R, Meek R. Mobile health (mhealth) approaches and lessons for increased performance and retention of community health workers in low- and middle-income countries: a review. Journal of Medical Internet Research 2013 Jan; 15(1):17. 10.2196/jmir.2130
9. Smeyanov V, Tarasenko S, Smeyanova O. Development and application of the informational and communication technologies in quality standards of health care management for patients with arterial hypertension. Georgian Medical News. 2014;7(232): 65–68.

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