
IT-COMMUNICATORS FOR MEDICINE

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Abstract: *Relationships and communication between doctors and patients is a very important problem in medicine. Analysis of possible interrelated directions of development and application of communicators in emergency and family medicine was performed. According to the first direction the IT communicators are intended for supporting alternative communication with the people lost temporarily or permanently possibility to speak. According to the second direction proposed communicators have databases included detailed information about types of diseases and traumas, and by results of analysis of injured person symptoms or feelings the software subsystem generates some variants of possible diseases or traumas diagnosis. It is proposed to apply special hardware-software means, particularly IT communicators to simplify the communication of doctors with patients (particularly with voice limitation) and increase treatment efficiency beginning from the first contact. Proposed IT communicators are used in family and emergency medicine for supporting first contact of doctors with patients (with voice limitation) and getting information about patient state, for example, during the preliminary examination of patients. Application of proposed modern computer devices and information technologies in medicine makes it possible to reduce a number of cognitive problems, increase the efficiency of the first contact of patients with doctors, quickly give a diagnosis and correctly select methods of treatment.*

Keywords: *IT communicators, problems of cognitivism in medicine, family medicine, speciality application-dependent software.*

ACM Classification Keywords: *J.3 Life and Medical Sciences - Health*

Introduction

Relationships and communication between doctors and patients is a very important problem in medicine. Ability of correct communication during the disease or separate stage of disease helps to diagnose, prognoses a clinical behavior, and accelerate the recovery.

Communication problems between a doctor and a patient influence correctness of the diagnoses and quality of a doctor aid, and complicate the medical treatment. In addition during the communication the problems of adequate understanding or cognitive problems appear too. These cognitive problems are connected with the avalanche of new medical data. Therefore it is very important to apply creative intelligent thinking and modern IT of trans-disciplinary knowledge transferring. Relations between doctors and patients are not restricted only to communication. Making a diagnosis, patient state examination, interpretation of the data received from a patient, treatment planning, and treatment evaluation are very important too.

Methods of evaluation and correction of diagnosis influence treatment planning and treatment effectiveness. Preliminarily it is possible to divide evaluation methods into subjective (based on communication) and objective (based on examination of a patient, and data of the laboratory, and instrument investigations).

It is proposed to apply special hardware-software means, particularly IT communicators to simplify the communication of doctors with patients (particularly with voice limitation) and increase treatment efficiency beginning from the first contact.

Work objective is analyses of possibilities of application of IT communicators for solving the cognitive problems of doctor-patient communication.

Received results

One version of the IT communicators was proposed in [Sergienko, 2013]. It is a mobile tablet computer with special application-dependent software.

Technical requirements for the development of speciality application-dependent software of IT communicator are rather simple. For this purposes it is needed a single core tablet computer with 10 in sensor monitor, clock frequency 1.2 GHz, RAM 512 MB, ROM 4 GB, OS Android 4.0. In addition it is possible to apply a monitor smaller than 10 in, but its application complicates data reading.

IT communicators are used for the following purposes:

1. In medicine: for supporting first contact of doctors with patients (with voice limitation), and getting information about patient state, for example, during the preliminary examination of patients. Particularly it is very important for family doctors because they are the firsts who examine patients with different diseases. Sometimes family doctors have no enough knowledge and experience to diagnose.
2. To make emergency medical aid for patients with voice limitation: in this case the IT communicators help patients to communicate with doctors.

Special application-dependent software consists of two subsystems. The first subsystem is used for the first contact of a doctor and a patient. The second subsystem is used for alternative communication of doctors with patient lost temporarily or permanently possibility of speaking.

The means of first contact medicine were analyzed. On this base technical requirements for the application-dependent software of the first subsystem were developed. There are many handbooks for family doctors issued as ordinary books. Unlike to modern mobile IT means it is rather difficult to use ordinary handbooks for supporting doctors to make diagnosis of injured or fall ill persons.

Sometimes knowledge and practical experience of family doctors are restricted and they may not know symptoms of some diseases and proper methods of first aid. It is known that correct first aid assigns efficiency of treatment and reduces probability of complication. Application of modern IT when making the first examination of an injured person helps to increase the probability of correct first aid.

The developed subsystem of IT communicator contains a data base with detailed information on majority of diseases and traumas, its symptoms, diagnostic methods and first aid actions.

The other aim of IT communicator is to support alternative communication with voice and motion limited patients. The idea of alternative communication is rather simple. Voice limited patient needs communication with surroundings in any way. The process of establishing relations with additional means helps patient with voice limitation to express his needs and wishes. Communicators for alternative communication are used to help voice limitation patients to understand surroundings clearly.

It was analyzed existing means for the communication with such patients. You can find below overview of some modern communicators for voice limitation people which used to nurse the sick and treatment.

The simple means of the communication are the following:

1. Paper, blackboard, cards. The means are used for only voice limitation patients without loss of motion.
2. Tables with repetitive words or phrases classified according to subjects.
3. Sign language for only voice limitation patients without loss of motion.
4. Short form messages by gesture, changing look of the face, winking, etc.
5. Simple signals such as bell, dot-and-dash, etc.

Above means have restricted use for communication in hospitals, domestic life, etc.

More extended and rather simple means for communication of voice limitation patients are the following;

1. Figure 1 shows the smart computer device GoTalk. It is the pad with 9/25/32 cells. Each cell contains audio text, supported with icons. If patient presses selected icon the audio text is reproduced.
2. So called medicine-social service of emergency aid for people with limited capacity "life button".



Figure 1. Smart device GoTalk

There are enough high-tech and multifunctional means for communication of people with move and voice limitation. Some of them convert text to voice. But all of them have some restrictions. Firstly, users of such means

are to be possessed of special knowledge and skill to work with computer software. They need to install it. Secondary, this means are rather expensive.

Of course there are high-tech smart eye controlled computer devices based on a video camera. Video camera tracks the patient's eye move and converts it to the computer monitor cursor move. Winking of eye is converted by device to mouth operation. The devices by Israel Company EyeTech or devices of EyeWriter family are a good example of such communicators.

The IT communicator designed in the V.M. Glushkov Institute of Cybernetics of National Academy of Sciences of Ukraine and in Shupyk National Medical Academy of Postgraduate Education makes it possible communication doctors and patients with move and voice limitation. Figure 2 shows the main menu of the smart communicator. There are five menu items: needs, recourse, pain, emergency aid, and keyboard.

Menu item "Needs" means for screening list of patient needs, particularly needs of eating, drinking, sleeping, pain relief, establish silence, hygienic procedure, etc. Menu item "Recourse" means for screening a list of patient recourse, particularly keep silence; speak loudly, on/off radio or TV, close/open window, etc. It is possible to extend these lists.

Menu item "Pain" helps a patient to specify the centre of pain location. The human body icon or its separate parts (hands, arms, head, feet, legs, torso, etc.) are displayed for the pain location, as Figure 3 shows. Voice commentary of these icons is possible. Pain location first of all is very important for protecting move limitation patients from decubitus.

Menu item "Emergency aid" means for emergency doctor call. The call is attended by the audible alarm.

Menu item "Keyboard" means for adding needs or recourses missing in menu bars. It is possible to convert written by patient needs to voice.

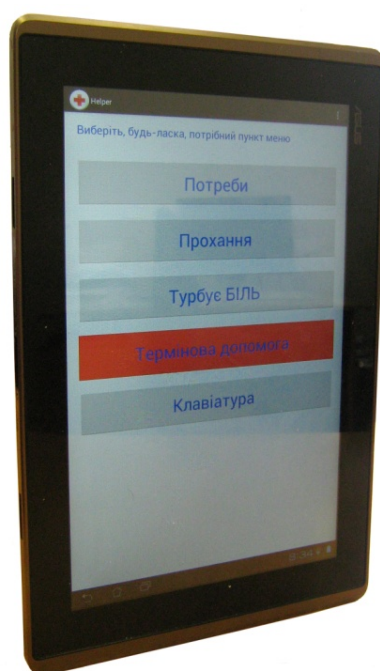


Figure 2. Main window

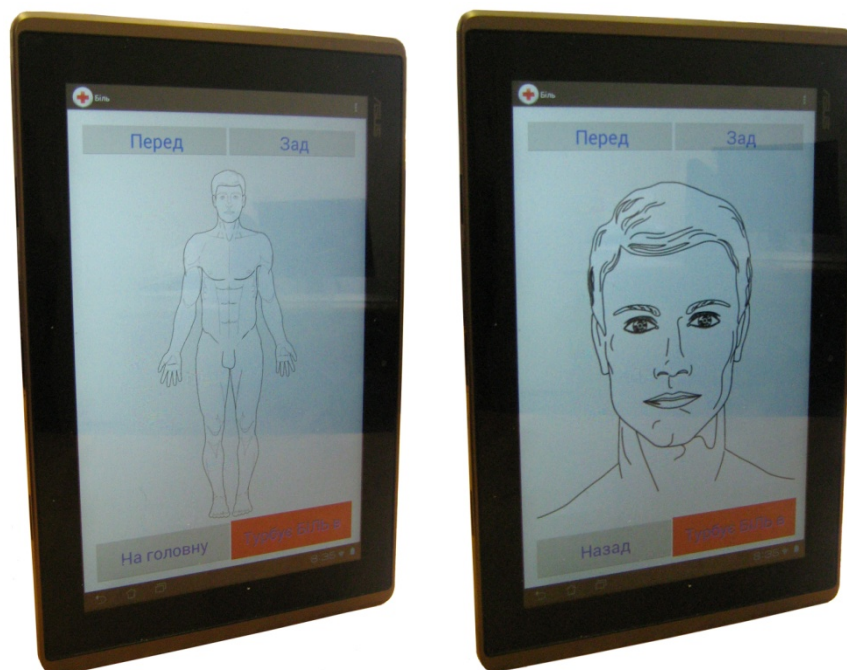


Figure 3. Pain location windows

It is necessary to add that IT communicator stores the patient medical history of pain, location of the pain, etc. This makes it possible to get pain dynamics, and on this base check validity of patient information and confirm diagnosis. If not, patient is needed in additional examination.

Conclusion

1. Application of modern computer devices and IT in medicine makes it possible to reduce a number of cognitive problems, increase efficiency of the first contact of patients with doctors, and quickly give a diagnosis, and correctly select methods of treatment.
2. IT communicators are very important in family medicine to make clear communication of doctors and patients to improve quality of the first aid.

Bibliography

[Sergienko, 2013] Patent of Ukraine №80490 "Method of communication with person with voice and auditory limitation" / Sergienko I.V., Voronenko O.V., Galelyuka I.B., Romanov V.O., 2013.

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