TRAINING COURSE “FUNDAMENTALS OF TELEMEDICINE” FOR STUDENTS OF MEDICAL UNIVERSITIES

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Abstract

Information and communication technologies (ICT) are of growing importance in healthcare and medical education. So doctors should gain skills and knowledge of general ICT’s and telemedicine application during their study at University. In 2013 an optional educational course "Fundamentals of telemedicine and e-health" was developed for students of the medical faculty in Nizhny Novgorod state medical Academy. Development of the course was preceded by a survey of student’s awareness and attitudes to various aspects of ICT’s application in medicine. The results of the survey showed that 60.4% of 149 respondents had a rough idea the term "telemedicine", while only 27.0% were able to formulate an acceptable definition of the concept. Students had a high level of general computer knowledge and a variety of the opinions about the value of ICT’s in healthcare, but a lack of information about telemedicine. A large group of students expressed a desire to gain additional knowledge and skills in telemedicine. In response, a theoretical and practical course, "Fundamentals of telemedicine", was developed. It entails of 24 hours of lectures, 22 hours of practice, 24 hours of self-study and a final test, and includes tele-education elements. The results of tests in the three years that it has been run show that the main objectives of the course have been effectively implemented.

Keywords: telemedicine; eHealth; students; survey; training courses

Introduction

Today it is almost impossible for doctors to perform their professional activities without using computers and information and communication technologies (ICT). The unified state health information system is planning to integrate numerous electronic services from patient appointment to the electronic insurance card, medical sick list, patient’s record-card, document management and data about medical institutions on their official websites. This includes working with computerised medical equipment, remote diagnostics, telemedicine consultations, video consultations, videoconferences, remote monitoring of body functions and, distant education in its various forms.

To cope with these numerous professional tasks, doctors should have general ICT skills and knowledge of telemedicine and its application. Ideally, this should be acquired during their study at University. Short courses for students, postgraduates, doctors and nurses have been organised since 2000, at the regional telemedicine centre, based at the Nizhny Novgorod Semashko regional clinical hospital, with remote participation of telemedicine experts in Moscow.

Based on this experience an optional/elective educational course "Fundamentals of telemedicine and e-health" was developed for students of medical faculty in the Nizhny Novgorod State Medical Academy in 2013. Over a number of years, separate elements of this course were developed at the faculty of social medicine and healthcare in the form of lectures, seminars, classes, and a science club.

The start of each course was preceded by a survey of student’s awareness and attitudes to various aspects of the application if ICT in medicine. The aim of this study is to report the findings of these pre-course surveys with special reference to difference between students taking the course in first year and fifth year of study.

Methods

The poll was held from the first to the fifth courses offered. The survey covered four domains: i) computer use and acquisition of computer skills, ii) awareness of ICT in healthcare and understanding of telemedicine.
and eHealth, iii) perception of the use and need for telemedicine and iv) students’ perceptions of the course and their future participation in telemedicine. The responses of first year and fifth year students are compared.

**Results**

Questionnaires completed by 149 students were reviewed. This is approximately 25% of students in the faculty. Of the respondents, 95.9% have a computer at home, 58.4% of students use it constantly and 35.6% use it periodically.

For training needs at University, 81.9% of the students regularly “constantly” use a computer, 13.4% occasionally “sometimes”, and 4.7% rarely use a computer. About 91% of the students used software for creating presentations, spreadsheets and emails. Interactive communication software such as Skype is used by 77.2% of students, and 4.0% of the respondents’ computer use is restricted to the set text only. About 96% of the students used the information obtained from the Internet, for the preparation of papers, reports and presentations.

It is interesting that first-year students surpass their senior fifth-year students in daily computer use, testifying to the continuous progress of various ICT’s in everyday life. While 98.6% of 5th year students got their computer skills at school and 1.4% at the University, 8.0% of first-year students got it in kindergarten, and the rest 92.0% at school. All first-year students had computer at home compared to 91.2% of fifth-year students. Constant computer use was reported by 65.5% of first-year students and 51.4% of fifth-year respectively. Interactive software communication (Skype, ooVoo, etc.) was used by 86.7% of first-year students and 67.6% of fifth-year students.

The second section included questions concerning awareness of students about specialised ICTs used for clinical, educational, managerial, and scientific purposes in healthcare. Only 60.4% and 67.7% of respondents respectively had a rough idea about such terms as "telemedicine" and "eHealth", while only 27.0% and 31.5% of respondents were able to formulate acceptable definitions for these concepts. Only 16.2% had received information about telemedicine in the educational process at University, and 23.0% from mass media, including the Internet.

Almost half (42.0%) reported that they had never have heard of telemedicine.

The third section addressed students’ attitude to implementation and use of telemedicine technologies. To the question "The need of telemedicine in health care?" 45.0%, answered positively, 4.7% negatively, while others were unable to formulate their attitude. There was a positive attitude towards the use of ICT in healthcare management, 77.9%, and 65.1% for remote consultations of patients. Every second student believed that the widespread introduction of ICT’s has a positive impact on the quality of medical care. Only 49.7% of students (52.0% of the senior students and 47.3% of first-year students) saw the need for distance professional education, which objectively demonstrates the need for wider inclusion of e-learning technologies in educational processes.

The last group of questions focused on obtaining information about the attitude of students to the study of the course, and their subsequent participation in telemedicine projects as young professionals. A large number of respondents, 40.9% would like to gain additional knowledge and skills in telemedicine. A third of first-year students and a quarter of fifth-year student would participate in research work on telemedicine topics. More than 42% of the students consider the use of telemedicine in their future medical practice desirable.

**Discussion**

The results showed a high level of general computer knowledge, but a poor understanding of telemedicine. There were a variety of opinions about the value of ICT’s in healthcare, and a large group of students wanted to gain additional knowledge and skills in telemedicine. All this confirmed the relevance to the respective course.

The aim of the course is attainment of professional competencies. These are the ability to work with medical equipment, used in investigation of patients, willingness to obtain information and to work with it in global networks, and the application of modern ICT to solve professional tasks. The course is based on eight textbooks written for the course and two monographs which have been published in Nizhny Novgorod State Medical Academy and Moscow publishing houses on the subject of the course. Part of the materials, including the textbooks, and tests are
freely available on the website of Nizhny Novgorod State Medical Academy.

The technologies used in the course are a hardware-software complex for video communication, and equipment to enter and display medical information such as a document camera, flatbed scanner, or digital camera. A high speed fibre optic communication channel with the Wi-Fi was used for communication.

Leading institutes, the Moscow State University, Moscow Medical Dental University, Institute of biomedical problems of RAS and others participated in demonstrations and sessions of video lectures on selected topics of the course. We gained some experience in the so-called "duplex" courses, when the cycles of teaching courses on the basics of telemedicine are synchronised in two different universities, this allows you to share training materials, perform video lectures and webinars for two audiences.

In 2014, the course "Fundamentals of telemedicine" consisting of theoretical and practical components (24 hours of lectures, 22 hours of practice, 24 hours of self-study and a final test) was worked out. An important feature was the wide use of distance learning technologies that simultaneously act as an educational tool and as a subject of development of practical skills. This opens up the possibility to invite the leading specialists from other organisations who has experience in telemedicine activities.

In adopting ICT in the learning process, we relied on a number of international and Russian regulatory acts in the field of health, education, informatics and telecommunications, including the Federal law in Russia "On education in RF".

The course includes the study of telemedicine technologies and services, equipment and software, legal issues and the economic basis for telemedicine. Skills in providing teleconsultation and educational electronic services are formed. During the course, students obtain skills in preparing electronic documents for teleconsultations (electronic health records), including methods of digitisation of medical information, search of information in the Internet to prepare abstracts and presentations for video lectures.

Students get acquainted with health information systems and specialised telemedicine complexes, including mobile telemedicine systems and tools of personal telemedicine. Management of telemedicine centres is taught. Special attention is paid to teaching students to use electronic resources created within the medical Academy and posted on the Web site of the Academy. This allows students to gain practical skills in their use during training and in subsequent professional activities.

The results of regular review and tests at the end of each course show that the main objectives of the course have been implemented with acceptable efficiency.

**Conclusion**

The course "Fundamentals of telemedicine and e-health" creates competencies, skills and abilities needed for future use of ICT’s in professional activities. Teaching students the basics of eHealth, including specialised telemedicine and educational technology, studying various types of professional information resources, software, and methods of distant-learning are necessary to grow a generation of doctors who actively use not only modern technology, but also promising forms of professional education to improve the quality of medical care.

Currently, the State Parliament is discussing legislation on telemedicine and ICT in healthcare. Therefore, in our opinion, it is expedient to introduce such courses in the basic educational programs for all medical universities.

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**Conflict of interest.** The authors declare no conflicts of interest.