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TELEMEDICINE AND TELEDIAGNOSIS – GENERAL PERCEPTION OF YOUNG STUDENTS FROM ROMANIA

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Abstract: *Telemedicine, through its advantages based on the synergic action of medicine, electronics and computers technologies, offers the facilities to support and to improve the quality of life and to facilitate rapid transfer of information at the distance for medical intervention, emergency situation or home care.*
The study indicated the knowledge and perception of your people (students in the first year of two faculties from Transylvania University of Brasov, Romania) concerning the problematic of medicine: area of applications, benefits, disadvantages, ethic issues, relation with classic medicine.

Key words: *telemedicine, perception of telemedicine.*

1. Introduction

Telemedicine, as a combination of telecommunications technology and medicine, use electronic information and communication technologies to provide and support health care when distance separates the participants [3].

In recent years there is a great concern for the development of telemedicine systems, which are very useful for providing remote healthcare services and communication among physicians, in order to establish a diagnosis. Telemedicine systems integration with hospital information systems is a continuing concern of researchers in this field [1].

According to recent studies, in Romania the most disadvantaged geographic regions South and Southeast, with a correlation of 773 inhabitants / 1 doctor respectively 655 inhabitants / 1 physician. North-eastern region of the country has a small number of doctors in rural areas (2778 people / 1 physician). In rural areas it was observed that there are 98 settlements with a doctor. It was noted the disproportionate coverage of the counties with specialists. In more than a third of the country, with approximately 30% of specialties not covered by qualified people in those areas (Bistriţa Năsăud, Teleorman, Bacău, Covasna, Mehedinţi, Călăraşi, Harghita, Buzău, Caraş-Severin, Gorj, Vaslui, Botoşani, Giurgiu, Ialomiţa, Olt, Tulcea). Among the specialties are deficient in some

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counties indicated clinical specialties involved in providing access to services: pediatric surgery, urology (missing in 6 counties), cardiology (Botosani), infectious diseases (Harghita), endocrinology (Mehedinti and Calarasi). Presidential Commission [12] noted the uneven distribution geographically and nurses (Vrancea, Giurgiu, Suceava or Harghita), with a density of less than 3 assistants corresponding to 1,000 people, compared to 4.5 per 1,000 workers that (media in Romania) and 7 per 1,000 (average in the EU). The pharmaceutical and dental field identified the same problems, their concentration being economically developed on urban areas (mainly in universities area). Sometimes non-transparent allocation of funds and inefficient use of resources, led to significant differences in access to health services, even when they are available. In some rural areas there are no medical services allocated to those populations.

Reform of the last period in the healthcare sector has resulted in the creation and operationalization of the health insurance system, decentralization of health services (eg, increasing the importance of ambulatory health services), establish and improve the legal framework for providing health services in hospitals and other health units, development and implementation of quality assurance procedures in hospitals etc. [4]. In Romania have started several projects for developing of telemedicine systems, and some of them are only are in the stage of implementation and operation.

"Implementing a telemedicine system is one of the solutions that are part of the Strategy for Delta Dunarii, a strategy aimed at attracting funds from nine ministries. This could be implemented in those localities where there are dispensaries appropriate to implement such a project and we hope that we will be contemporary with putting it into service", said Victor Tarhon, the president of Tulcea County Council. By transforming the retirement home into a Health Center at Sulina, for the health of 15,000 patients from rural Delta could be a solution the possible implementation of a telemedicine system (Danube Delta is one of the most inaccessible areas, access to village usually is realizing only by water) [14].

The study aims to find the information of students from Romania – Transilvania University of Brasov (Faculty of Medicine and Faculty of Electrical Engineering and Computer Technology - IESC) on the issue of telemedicine and telediagnosis, by administering questionnaires with suggested simple or multiple answers.

2. Materials and methods

Significant questions were selected and organized as a questionnaire divided into two parts: general information about the person interviewed (preserving anonymity, according to medical ethics) and questions about issues of telemedicine (applications, benefits, comparison techniques classical notions of ethics, etc.). Questionnaires were administered to students of Transylvania University of Brasov, using students from the first year enrolled at two faculties with different background: one faculty from the field of life sciences - Faculty of Medicine (MED) and one engineering faculty - Faculty IESC. We received 140 completed questionnaires, having 70 persons from each group. We used the facilities of Excel - Pivot Tables for fast analysis study groups. According with the ethical statement, the participants of this study were prior informed that all the data are anonymous and by completing this questionnaire they are indicating their consent to participate in this research [11]. The authors declared that there is not conflict of interest statement, according with Springer recommendations and the rules of ethics in research.

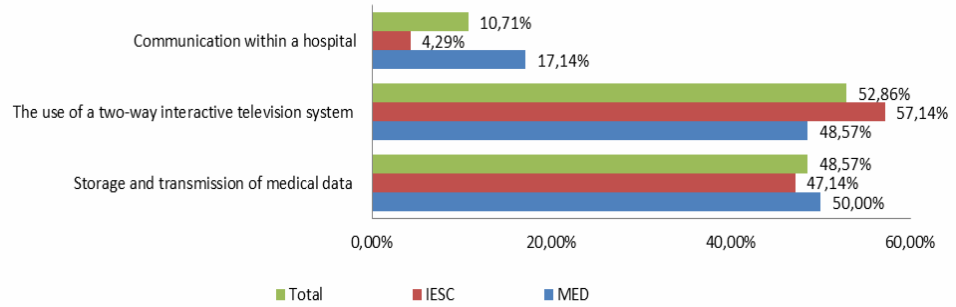

Fig.1. *Distribution of answers concerning the used of different ways of communication during the telemedicine procedure*

Table 1

Distribution of the people, by gender and the faculty

Gender	MED		IESC		total	
	N	(%)	N	(%)	N	(%)
men	54	77.14	23	32.86	77	55.00
women	16	22.86	47	67.14	63	45.00
total	70	100.00	70	100.00	140	100.00

3. Results and discussions

The distribution by gender of groups involved on our study was indicated in Table1. Each lot of study had 70 students, but the ratio between men and women was different, according with the specialty of the study: lower than 1 for Faculty of Medicine and higher than 1 for IESC group. Distribution of the people included in the study, by age and the faculty was 19.81±1.75 years for MED group, and 19.37±0.68 years for IESC group. For both groups of study the median of the age was 19 year.

Both groups indicated similar answers concerning the use of tow-way interactive television system and the possibility to have storage and transmission of medical data, but the answers were in different percent when they indicated the possibility to have communication within the hospital using telemedicine (Fig.1). The participants involved on telemedicine procedures could have different types of location [9], [10]:

• standing and/or accessible: medical centers, consulting rooms, schools, sports sites, prisons, nursing homes/ assisted living etc.

• mobile and or remote: medical caravans, ships, military mobile units, space stations, etc.

From the suggested applications of telemedicine, the respondents indicated the data presented in Fig.2.

There were observed that 8 times lower was the percent of people from IESC (1.43%) indicating that reducing the costs of maintain of medical office is an area important for telemedicine, versus the group from MED group (11.43%). Also the application for ambulance service was not selected by a higher percent of the people involved on the study, the percent indicated by MED group being more than two times higher than indication of the people from IESC group. The students indicated that telemedicine can be used in the following areas (Fig. 3).

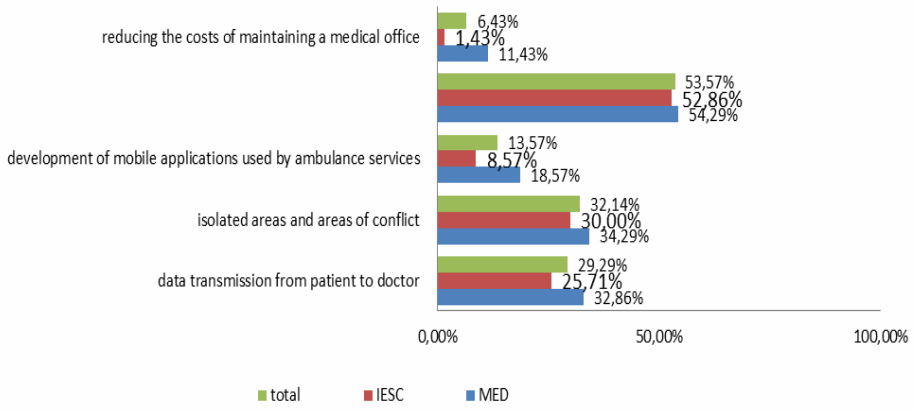

Fig.2. *Applications of telemedicine*

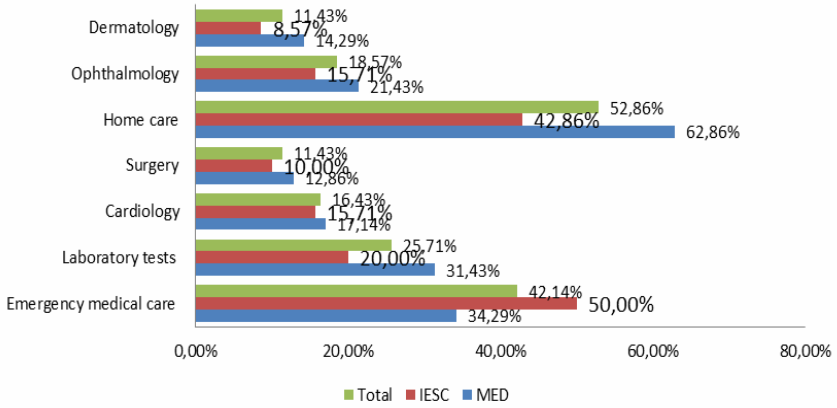

Fig.3. *Medical area were telemedicine could be implemented*

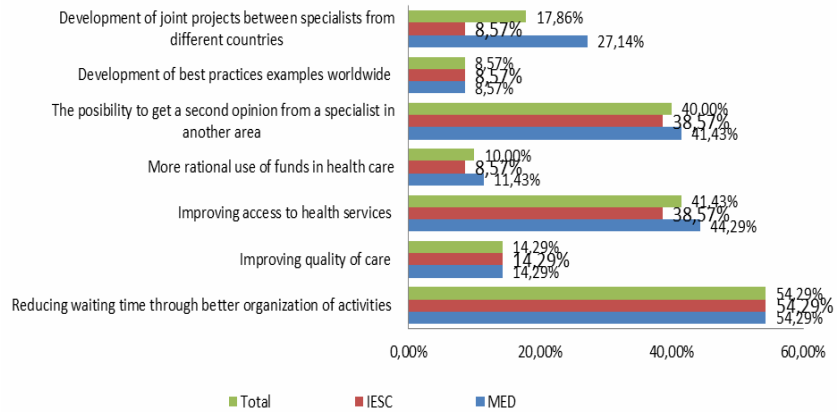

Fig.4. *Benefits of the patients using telemedicine*

Home care (52.86% from total group) and emergency care (42.14% from total group) are the most indicated area of application for telemedicine. Laboratory tests, emergency medical care and home care were indicated in higher proportion by MED group, as 31.43%, 34.29%, 62.86% respectively. The biggest proportion of the answers (50%) provided by IESC group indicated emergency medical care as principal application of telemedicine. Telementoring and robotic telesurgery are described in the literature [7].

Integration between surgery and telecommunications can be one of the most important achievements of modern (tele)medicine and its integration into safe medical practice should be a priority for surgeons. Telesurgery programs help young doctors and experts to interact, to work as a team [8]. Scientific studies have shown that robot-assisted interventions can be considered as very useful innovations in abdominal surgery, indicating the possibility to compensate the shortcomings of conventional laparoscopy [6].

Radiology is one of the fields where telemedicine has been more developed, including different ways: teleconsulting, telediagnostic, e-Learning. The images acquired with different medical devices are a real support in diagnosis and follow-up of treatment indicated. The large number of images acquired for a particular investigation and the large number of investigations that are conducted daily raises the problem of storing these images and related in-formation. In addition it is important remote access to this information and can remotely view images.

To provide real support diagnostic images must usually be subject to processing algorithms, which provide better accuracy be either three-dimensional reconstructions, or carry out certain measurements. Typically, devices and software acquisition provides implementing many such processing. Often, however, they are dedicated to either certain types of images, be certain pathologies and not modification application to perform any other operations. Different acquisition devices can provide additional information about the same anatomical area. Therefore, merging medical images from different devices is an area where research focuses efforts [7].

Implementation of systems in telemedicine is a current concern worldwide. There are many telemedicine systems implemented using different technologies to provide diagnostic and support information both qualified personnel and patients. Some are specific to a particular area (or system TENPET MIPA), others are more general (HealthOptimum) using DICOM format or common image formats (Telenegatoscope, MIPA) [13]. The participants were asked to indicate benefits of the patients using telemedicine and their answers were indicated in Fig.4.

Knowing that telediagnosis is one of the remote diagnosis methods, using high-end technology, the participants to the study were asked if they think that the diagnostic obtained in this manner has more credibility than the one where the patient also undergoes a physical exam. The obtained results indicated that 15.71% from the students of MED group provided a positive answer and also a percentage of 10.00% from IESC group. Negative answer was indicated by 75.71% from MED group and 72.86% from IESC group. More than double percent from IESC group (17.14%) versus MED group (8.57%) indicated that they don't know.

The intensive use of telediagnosis during the last years indicated that some of the techniques could replace total the traditional diagnosis [6], but also studies indicated the necessity to combine telediagnostic tools with the classic medical techniques. Concerning these topics, our groups indicated the answers presented in Table 2.

Table 2

The answers concerning the total or partial replace of traditional diagnosis with telediagnosis

Question	Positive answer %		Negative Answer %		Uncertain answer (Don't know) %	
	MED	IESC	MED	IESC	MED	IESC
Telediagnosis totally replace traditional diagnosis	5.71	7.14	87.14	75.71	7.14	17.14
Telediagnosis be used as a complementary tool of traditional diagnosis	80.00	74.29	14.29	12.86	5.71	12.86

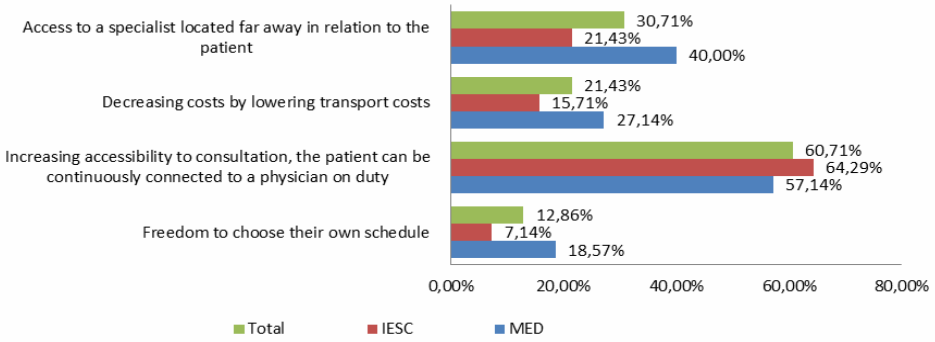

Fig.5. *Benefits of telemedicine for health care staff*

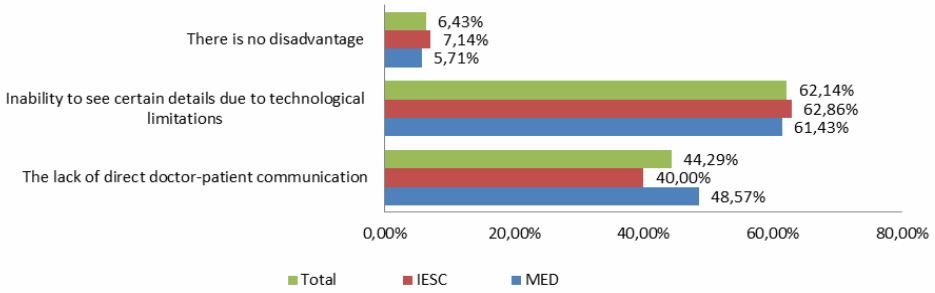

Fig.6. *Disadvantages of using telediagnosis*

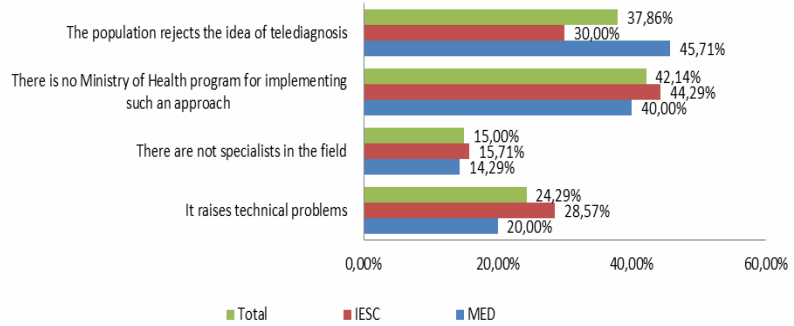

Fig. 7. *Reasons why telemedicine is not extensively used*

Both groups indicated that telediagnosis is a highly proficient method that allows you access to specialty consultations in clinics around the world, access to high technology investigations anywhere – MED (65.71%) and IESC (67.14%). A percent of 54.29% from IESC group and 42.86% from MED group indicated that quality of the medical act be improved using telediagnosis. Only a percent of 17.14% from IESC group and 58.57% from MED group indicated that diagnostic errors are reduced using telediagnosis. Several benefits of telemedicine for health care staff are mentioned in Fig. 5.

The main disadvantages of using telediagnosis are indicated in Fig.6. Based on the perception of young students, telemedicine of is not widely used because of several rea-sons presented in Fig.7.

Based on the obtained answers, ethical issues in telediagnosis were identified and selected by approximately one third from people from each group. But also some of the people indicated that using telediagnosis are not involved ethical issues, because all the systems are safe: 25.71% - MED group and 38.57% from IESC group.

In an ethical way is very important to be more critical about using telemedicine, but in the same time to encourage the process of implementing them, associate with the main scope of using technology in medicine: to help better diagnostic, to solved user and more quickly all medical problems. Telemedicine is a challenge for all of us, but is now normality in more and more medical fields.

4. Conclusions

Large applications of telemedicine in prevention systems, in solving emergency or medical or surgical disciplines favoured in different regions and countries more efficient medical services in hospitals and at home. Some of the techniques are already implemented in Romania (emergency system) or are identified projects to sustain financially these investments.

Administered questionnaires indicated differentiated knowledge concerning telemedicine and telediagnosis between the young students from the studied groups. This could be explained because of their different background and relation with the general topic of the questionnaire.

The advantages of telemedicine are properly notified of respondents, but with different proportions for the groups studied. Not all possible applications of telemedicine have been identified with a higher proportion as possibilities for telemedicine implementation.

Active involvement of different specialists from various interdisciplinary fields and the sustaining of the research and educational programs will trigger telemedicine and telediagnosis in the area of life sciences (food analysis, environmental protection, medical sciences) and will form specialists ready to develop opportunities and to apply successful these new methods for the benefit of increasing the quality of life.

Conflict of interest

The authors declare that they have no conflict of interest.

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