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Effectiveness of Information Technology (IT) in the healthcare system: Faculty members' attitude at Hormozgan University of Medical Sciences,

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Abstract: Introduction: An effective use of IT in the realm of healthcare requires an analysis of opportunities and limitations, principled planning in accordance with social and economic factors along with the provision of technological, communicative and legal infrastructures. This research aims to determine the effectiveness of IT in the healthcare system as perceived by university faculty members.
Methodology: The present descriptive cross-sectional study was conducted in 2014 in the form of a census on 83 faculty members of Hormozgan University of Medical Sciences. The data gathering instrument was a questionnaire developed by the researcher. It was comprised of three sections: demographic information, effect of IT on medical, research-based and administrative processes, and finally one question inquiring the suggested strategies to increase the effectiveness of IT in this realm. The reliability of the questionnaire was checked using Cronbach's alphaand was found to be .829. Its validity was established through inquiring the comments of a number of healthcare IT specialists. Using SPSS-16, the data were analyzed. Descriptive statistics (mean, mode and median) were used to analyze the data.
Results: In the research population comprised of 45.8% women and 53% men, the highest academic degrees were expertise and specialty (38.6%). As the lowest degree, doctorate was held by 30.1% of cases. The majority of subjects (39.8%) believed that using IT could lower the rate of medical errors. 37.3% attested to the effect of IT on increasing productivity. Moreover, the target population evaluated the effect of IT on improving the status of healthcare and medical instructions respectively as 32.5 and 39.8 percent.
Conclusion: The majority of faculty members are adequately aware of the effect of IT on medical research and production of information sources. However, their awareness of the quality of healthcare services is moderate. Therefore, a design of appropriate technical and communicative infrastructures is suggested to take the utmost advantage of technology in all aspects of healthcare provision. Actions can be taken to further familiarize clinical professors with the effectiveness of IT in the quality of healthcare services.
Key terms: attitude, effectiveness, IT, healthcare system.

Introduction:

Advancement in technology within the past years has made considerable transformations in medical healthcare provision. Modern medicine and technology are mixed to help physicians in their diagnosis and treatment of diseases. The trend of technology development is rapidly on the rise[1] (1). IT is the best instrument for bringing justice to society (2).

IT in the realm of medicine has the potential for improving public healthcare and providers' performance, productivity quality, low cost, better interactions with patients. Despite such privileges, physicians and hospitals still rarely benefit from IT in healthcare domain and in patients' electronic files (3-5).

Internal changes in the health system and altering the disease-oriented attitude to a health-oriented one and an individualistic view to a socialistic one in recent years along with the imperceptible advancement of IT in the world have been followed by an improved quality of healthcare services (4, 6). Studies conducted so far revealed that IT acted as a potent instrument and as a key factor in increasing organizational efficiency and efficacy. It has attracted the attention of different countries to the significant role of healthcare industry and its direct and indirect effects on different aspects of society. If applied in the healthcare system, IT can contribute to the current status of patient care, situation-specific clinical decision making through the high-speed and facilitated recovery of data. It can also influence other administrative and executive procedures and other aspects of information applicable to education and research. All this helps to realize the main goal of the healthcare system which is to improve social health (3). IT serves healthcare, its management and access to data through collecting individuals' health info and turning it into personal medical files. In public health, it speeds up the diagnosis of an epidemic disease nationally, traces and treats diseases and collects comparable data in terms of costs and the quality of care (8). Among factors increasing the demand for healthcare technology, mention can be made of scientific and engineering advancements, financial motivation of companies producing technologies, prevention of medical errors, providers' competition over the use of technology, public demand due to consumers' raised awareness, increased quality of healthcare and medical services and eventually increasing access to such services (1, 9).

Information management activities are limited to managing direct paper-based information. Although the benefits of using medical IT are evident in theory, the corresponding of the new information in healthcare systems is challenging (9). As evidence shows, high costs have been on the rise in global healthcare system and are increasing more rapidly than any other economic system. In the realm of healthcare provision, technology has produced constant challenges. Therefore, the efficient and effective use of IT in the medical domain needs to be guaranteed (1). Moreover, the advent of new and costly technology, chronic diseases and high public expectations from the healthcare system worldwide have increased medical costs (10). In developing countries, IT is used to facilitate consultation, treatment and diagnosis of diseases. In these countries, physicians view medical networks as resources for solving medical problems involving local diseases, AIDS, major medication, public health and child health (6).

New terms have taken into account the significance of IT as a key principle. According to the health information charter, health-related information is supported by making revisions using IT (11).

Using IT effectively in the realm of healthcare requires a recognition of opportunities and limitations, devising principled planning appropriate to social and economic factors as well as the provision of technological, communicative, tele-communicative, legal and administrative infrastructures (2). In order to develop IT in healthcare and medicine, there is a need for the best practical methods based on technology and the selection of the most appropriate goals. Coming to know the potential effects of IT on healthcare services can act as the basis of strategic planning (3). Increasing the efficiency and effectiveness of healthcare services, bringing justice, financial support and improved management are among the goals of reforms made to the healthcare system (11).

Undoubtedly, university professors teaching at Hormozgan University of medical sciences who educate students as future experts in the national healthcare system play a key role in promoting students' knowledge and awareness of the effectiveness of IT in the healthcare system (6).

In the present research it has been attempted to investigate the positive and negative effects of using IT in the healthcare system as perceived by faculty members. The goal was to assess faculty members' attitude as

the most important IT users and the ones involved most in the transformation plan of the healthcare system in order to measure their reception of such systems and the role and development of the plan.

Methods:

The present descriptive, cross sectional research was conducted in the first semester of 2014. It investigated the attitude of about 80 subjects (in a census). They were academic members of Hormozgan University of Medical Sciences. Their attitude was investigated towards the effectiveness of IT in the healthcare system using a questionnaire developed by the researcher. This questionnaire was comprised of three sections. The first section consisted of 6 items about the demographic information of the target population. The second section had 16 items about the effect of IT on medical, educational, research-based and administrative procedures. The third section had only one item inquiring about the suggested strategies for increasing the effectiveness of IT in the healthcare domain. The scoring system of the questionnaire was as the following: "I don't know" would get score 0, the response "a little" would get 1, "moderate" would get 2,"great" would receive 3 and finally "really great" would get 4. Subsequently, the significance level of each research question was estimated. In order to develop the questionnaire, previous similar studies were perused such as "An investigation of the effectiveness of IT in the healthcare system perceived by the academic members of Iran's universities of medical sciences" or "The effect of IT on promoting the healthcare system as perceived by the staff of ShahidBeheshti hospital in Kashan". To validate the questionnaire, the comments made by a number of IT professors were used. Subsequently, the data were analyzed using descriptive statistics. After coding the questionnaire and entering the data into SPSS, the data were analyzed. All the academic members of Hormozgan University of Medical Sciences were authorized to enter this study. Just those who left the university in the meanwhile were excluded from the study. In all other cases, inclusion was with the full consent of participants.

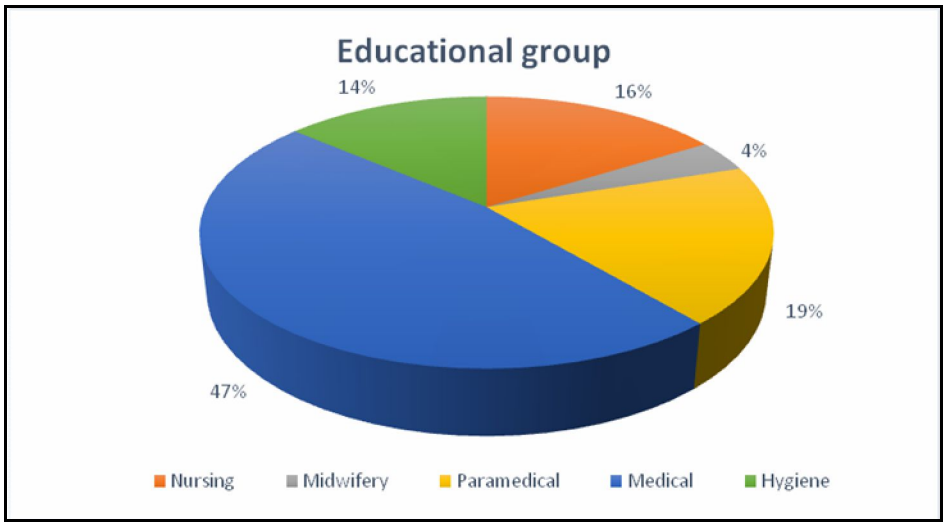
Findings:

From the 80 participants of this research, 44 were male (55%) and 33 were female (43.8%).

The majority of participants belonged to the age group 40-50 years (46.2%). Next stood the age group 30-39 years (35%).

41 subjects (51.2%) had a teaching experience less than 10 years. 24 subjects (30%) had between 10-20 years of experience. Finally, 14 subjects (17.5%) belonged to the age group 20-30 years. The highest academic degrees were expertise and specialty comprising 38.8% (31 individuals) of the total number of participants. Other degrees included 25 subjects holding an M.S. degree (31.2%) and 24 subjects (30%) holding a doctorate degree.

The diagram below indicates the percentage of frequency in each educational group investigated in this study:



The research population evaluated the effectiveness of IT in lowered costs, faster diagnosis and treatment procedures and increased productivity as these scores show: 36.2%, 33.8% and 30%. Moreover, the overall attitude towards the effectiveness of IT in promoting the level of healthcare was found to be 38.5% and positive, in the target population.

The majority of participants (35 subjects, 43.8%) believed that using IT strongly affected the reduced use of forms related to patient's medical files as well as printed sources. 32.5% (26 subjects), 16.2% (13 subjects), 5% (4 subjects) respectively described this effect as 'great', 'moderate' and 'a little'. 2.5% (2 subjects) of the faculty members had no knowledge concerning this.

Detailed findings are presented in table 1:

Table 1: Distribution of frequency of faculty members' attitude towards the effectiveness of IT in medical, educational, research-based and administrative procedures

Total	Really Great	Great	Moderate	A little	I don't know	Effectiveness of IT
80(100)	26*(32/5)	35(43/8)	13(16/2)	4(5)	2(2/5)	Increased use of forms related to patients' medical files and printed sources
80(100)	14(17/5)	31(38/8)	24(30)	9(11/2)	2(2/5)	Occurrence of medical errors
80(100)	42(52/5)	28(35)	7(8/8)	2(2/5)	1(1/2)	Medical research
80(100)	30(37/5)	32(40)	16(20)	1(1/2)	1(1/2)	Medical science education
80(100)	26(32/5)	26(32/5)	18(22/5)	4(5)	6(7/5)	Prevention of distortion and rewriting of information and ignoring patients' legal rights
80(100)	34(42/5)	33(41/5)	6(7/5)	4(5)	3(3/8)	Consistency of health-related information
80(100)	20(25)	34(42/5)	13(16/2)	4(5)	7(8/8)	Evaluating the precision and accuracy of financial exchanges
80(100)	39(48/8)	27(33/8)	10(12/5)	2(2/5)	2(2/5)	Production of information sources
80(100)	12(15)	24(30)	33(41/2)	5(6/2)	6(7/5)	Evaluation of healthcare provided to patients
80(100)	10(12/5)	15(18/8)	35(43/8)	12(15)	7(8/8)	Reduced unwarranted reception of patients
80(100)	6(7/5)	19(23/8)	32(40)	14(17/5)	8(10)	Motivating the staff
80(100)	21(26/2)	23(28/8)	20(25)	8(10)	7(8/8)	Tele-medicine

* ( ) = percentage

Discussion:

Healthcare IT is a combination of medical sciences and information technology. It contributes to decision making processes electronically as in computer hardware, software and communication networks to collect, process, distribute and share audio, video, textual and numerical data. A myriad of factors affect the application of IT in healthcare domain including the computerization and advancement of technology, structure of medical profession, medical economy, medical and occupational procedures, human factors, government and its laws (12).

The majority of participants in the present research that is 76.3% (61 subjects) believed using IT in the national healthcare system would lead to an increase in using forms and printed sources. This is in line with the

findings of Safdari et al. However, Mason medical organization in the U.S. reported in an academic study that using an electronic system could lower the costs of producing paper sheets for forms and print-outs for 33% (13).

As formally reported by Starfield Institute and IOM, medical errors in the U.S. hospitals and healthcare centers stood as the third most prevalent cause of mortality in this country and that 98,000 people die annually due to such errors (14-15). In the present study, about half of the subjects (56.3%, 45 subjects) evaluated the effectiveness of IT in the occurrence of medical errors as 'great' and 'really great'. However, according to the findings of IOM (2000), the application of IT in medical centers led to a 74.3% reduction in medical errors (16).

ShokrizadehArani et al. McMullin et al., Field et al. and Nies et al. stated in their research that using IT can reduce costs especially those of medical prescriptions, recurrent activities and repeating the tests (17-19). In their research, Tierney et al. investigated the effect of healthcare IT on productivity and found an absolute 12.7% reduction in direct costs of receiving patients during their stay (20). This finding was in line with the results of the present study.

Safdari et al. conducted a study in which they investigated the effectiveness of IT in the healthcare system and realized the key role of IT in promoting the healthcare system. Moreover, Shokrizadeh et al. found that their research population's attitude towards the effect of IT in promoting the healthcare system was positive. Similarly, the present research indicates that 38.5% of subjects have had a positive attitude towards it (21).

Strategies suggested to enhance the effectiveness of IT in the healthcare system, as perceived by faculty members, were: correct and systematic planning for tracing people's health, creating electronic identification files (patients' electronic files) at the service of a better diagnosis and patients' convenience. These are in line with the findings of Asadi et al. who examined the challenges of applying IT. They also indicated how IT could be used in storing patients' information in their electronic files (22).

Overall findings of the present paper show that IT is very effective in medical, educational, research-based and administrative procedures. Considering the lack of sources in the healthcare section and the high costs of purchasing and using expensive technologies, systematic actions need to be taken so as to optimize healthcare resources and also increase their effectiveness. One strategy is evaluating IT which is in turn one way of controlling income and expenditures in the healthcare domain.

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