Information and communication technologies in mexico's health care

Diana Dolores De la Cruz Arias, José Ney Garrido Vázquez, José Ángel Jesús Magaña, Alejandro Hernández Cadena, José Manuel Gómez Zea

Tecnológico Nacional de México Campus Villahermosa, Cd. Industrial. Carretera Villahermosa Frontera, Km. 3.5, Cd. Industrial, Villahermosa Tabasco, CP: 86010.

Abstract

Future medical care may be different depending on how it meets and prepares for the era of the Fourth Industrial Revolution, which is said to be a great threat and a new opportunity. At this point, it is expected that medical professionals can lead the precision medicine of the future and develop it towards a better future by using Information and Communication Technologies in the medical field without being subordinate to technology. The aim of this article is to systematically identify the opportunities that ICT offers to health services.

Keywords: ICT, eHealth, Health sector.

1. INTRODUCTION

Interest in the application of information and communication technologies (ICT) in health care is often driven by the rising and unsustainable costs of health care services. In turn, the unprecedented growth of the world's population has urged institutions, businesses, industries and governments to respond to people's medical needs.

ICTs influence the growth of economies and business efficiency and facilitate innovation through diffusion processes, usage practices and commercial success.

Increased patient safety is one of the reasons for promoting the use of information technologies in healthcare. In several studies based on real healthcare episodes, it has been shown that in many cases, essential patient clinical information is not available to healthcare professionals, which in some situations leads to medical errors that could have been avoided with the provision of complete and accurate data in the medical record.

At present, the provision of health services in Mexico faces barriers, such as the lack of infrastructure, the distance between users and services and the scarcity of human resources, which makes the vast majority of the population helpless. To address this problem, the World Health Organization (WHO) established the e-health strategy, also known as eHealth. This proposal was adopted at the 58th World Health Assembly in 2005.

In May 2012, Article 32, Chapter II of the General Health Law was amended in Mexico. This article mentions that medical care may be supported by electronic means to protect, promote and restore people's health. Hence, ICTs give meaning to the operationalization of the concept of eHealth, since with information and communication technologies (ICTs) applied to the field of health, the user can have access to content related to self-care and health care providers will find the means to train and get involved in continuing education.

2. E-HEALTH IN MEXICO

According to Dr. Ramiro Iglesias Leal, Mexico has been involved in e-health development for a long time. In late 1968, Dr. Iglesias was completing an advanced course in aerospace medicine in the NASA Air Force when the Apollo 8 medical control team invited him to be the cardiologist for this mission. He received the first electrocardiogram and pneumogram sent from lunar orbit.

Table 1. Shows the chronology of the programs that made inroads into the health system in the use of communications.

YEAR	PROGRAM
End of 1970's	As part of the IMSS-COPLAMAR program, the Mexican Social Security Institute (IMSS) is developing a rural radio communications network to support communications between medical units.
1985	The IMSS-COPLAMAR program is restructured, limiting the scope of the network extension.
1985	Due to the devastating impact of the earthquake in Mexico City, the National Aeronautics and Space Administration (NASA), supported by the Advanced Technology Satellite-3 (ATS-3), is facilitating the American Red Cross and the Pan American Health Organization (PAHO) to provide voice support. Because terrestrial means of communication collapsed, with the exception of radio lines. During the first 24 hours after the disaster, ATS-3 prioritized communications necessary for damage assessment and rescue operations.
1985	The television health education program was launched at the Federico Gómez Children 's Hospital in Mexico called "Centro Mexicano de Educación en Salud en Televisión" (CEMESATEL).
1994	SSSTE conducted the first analysis to implement telecommunication technologies in the health sector
1995	The first telehealth program with institutional coverage becomes operational.
1996	Surgical services at Hospital Torre Médica are supported by surgical robots and telepresence that allow surgeons to perform and direct procedures remotely in the operating rooms and hospitalization areas.
2001	The Ministry of Health, considering the e-Mexico National System initiative and existing national experiences through the Inter-Institutional Committee, proposed the Action Program: e-Health Telemedicine 2001-2006.
2007	The Telehealth Action Program 2007-2012 is published and put into operation, with the objective of supporting and establishing a reference framework and integration of plans, programs and resources for the configuration of a National Telehealth System.

3. ICTS APPLIED TO HEALTHCARE IN MEXICO

Currently, among the ICTs applied to healthcare in Mexico, the following can be identified:

1. **Electronic medical records:** All patient information is kept in order to support decision making applied to their management and treatment. Mexico's experience with the "Colima Administrative Electronic

Health Record System" is a clear example of the progress that has been made with this tool. In terms of its standardization and interoperability, it allows the exchange of information between different equipment and software in different places, in accordance with official health standards, as well as the electronic exchange of data and the rules that regulate them, in order to obtain secure and reliable information.

2. **Telemedicine:** Facilitates the provision of services (medical consultation) using ICTs and shortens distances. The Telehealth Observatory of Mexico has been developed; 15 of the 32 states of the Mexican Republic have been integrated.

3. **mHealth:** Can be used to monitor and record vital functions and provide alerts for disease management. These applications can be downloaded from the network to smartphones and other wireless devices. Most of them are commercial devices. In the health sector, Mexico has not developed these applications for the population, as their use is not included in the legislation.

4. **eLearning:** Includes distance learning and training and facilitates the quality of education and the delivery of educational services. The National Institute of Public Health of Mexico has a website for the School of Public Health of Mexico ESPM 2.0, through which graduate programs are offered online.

5. **Continuing education**: Refers to training in health issues using ICTs, including the exchange of scientific knowledge through social networks and free electronic publications.

4. BENEFITS OF ICTS IN THE HEALTH SECTOR

The eHealth is the application of ICTs in the healthcare area through the use of medical software and is part of healthcare technologies. Its main objective is to serve health professionals to improve the quality of health care.

The following are the main benefits of implementing ICTs in the health sector:
- Reduction of risks associated with illegible handwriting on documents.
- Elimination of duplicate records.
- Security of patient data. Compared to paper records, electronic records are much less vulnerable to loss or misplacement of information. As a result, the potential loss of confidential patient information is protected, as the system has high information security standards.
- Patient records can only be accessed by authorized users with a password, and all their actions are recorded in the system.
- Statistical information generated instantly. Thanks to the availability of real-time statistical data that eliminates long waiting periods, effective real-time monitoring of potential health risks is achieved, triggering timely prevention protocols to avoid adverse events in patients.
- Increased prescription security.
- Availability and retrieval of patient and administrative information from any place and at any time.
- Significant time savings by eliminating the manual process.
- Decrease in the number of medical or other healthcare personnel errors, mainly illegibility, incomplete data or deficiencies.

5. ICT IMPLEMENTATION IN MEXICO

The ICT infrastructure in private sector healthcare units varies.

Some hospitals, such as Hospital Médico Torre, Hospital ABC, Hospital Médica Sur, have an excessive use of technology. However, for the private sector, the ICT market is found in the international supply. In very few cases there is a national offer. Part of this is concentrated in the electronic medical record, which is used to a limited extent in the network of private clinics and doctors' offices. This limitation is expressed in its use for medical care purposes, as well as for the generation of knowledge by the services.

In the private sector, telehealth has been adopted mainly as teleradiology, telepathology and tele education. These are mature applications of telemedicine, are not very complex and do not require a great deal of interaction between professionals and patients.

The offer of services provided in the areas of ICT and health in the Mexican industry are limited, organizations have opted to develop human resources with a technological profile and with a limited participation of health professionals.

6. OPPORTUNITY FOR CHANGE

Incorporating ICTs in public health in Mexico, as mentioned above, can generate many benefits.

Although some actions implemented in the sector stand out, and it is recognized that the subject is at its best moment, its development is still unexplored. Promoting it would make it possible to acquire better public health diagnoses. It would also pave the way for a more precise concentration of programs and more appropriate mechanisms for priority attention. It would also help to make access to these services more widespread.

7. CONCLUSIONS

The implementation of ICTs in the health sector is already a reality.

This situation gives way, in addition to the benefits mentioned above, to a profound change of mentality, with important changes in the workflows in healthcare centers and in the relationships between healthcare systems and the community they serve.

Wanting to change the mentality, in an environment where patients' health information is shared and available, suggests challenges and some risk, but also many opportunities for users, professionals and healthcare organizations. ICT has been shown to play a fundamental role in sharing patient information, as it facilitates better health care by reducing the chances of human error. Most ICT applications can be observed in: patients, hospitals and physicians. In patients, it can be found in websites for health communities and personal health record systems; in hospitals, it can be seen in interoperability, electronic invoices, electronic prescriptions and telemedicine; in relation to physicians, it can be seen in online resources, support for medical personnel and telemedicine, as well as voice recognition software.

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correo de autor: *m19301420@villahermosa.tecnm.mx*

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