Chapter 12

Medical Informatics

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Medical informatics, according to Blois & Shortliffe, is the field of study related to the wide range of resources that can be applied in the management and use of biomedical information, including computing medicine and the very study of the nature of medical informatics. It is a multidisciplinary field [1, 2, 3, 4]. If biology means 'the study of life', and pathology means 'the study of illness', then medical informatics means the 'study of information in the provision of health care'. It is the study of how we organize ourselves in the creation and day-to-day functioning of healthcare organizations [5, 6].

12.1 Introduction

In the early 1970s, after several investments in medical informatics in the US and Europe had already been observed, we had the first step of these studies in Brazilian territory. The Hospital of the Federal University of Rio de Janeiro (UFRJ) [7, 8, 9, 10, 11], the Heart Institute, and the Clinics Hospitals of the University of São Paulo started to use computer technology to help in medicine [12, 13, 14]. Luiz Carlos Lobo, professor at UFRJ, brought the Massachusetts General Hospital Multiprogramming System to Brazil and created the Health Education Technology Center, where the first use of PDP-11 digital minicomputers was made in teaching support [15, 16, 17, 18].

As a result, the first systems based on microcomputers were developed at the UFRJ hospital, and, in the Heart Institute, advances were made after the importation of Hewlett-Packard minicomputers, such as the assembly, in 1976, of the first systems of digital physiological monitoring and support for hemodynamic tests in Brazil, which gave rise to the Coordination of Medical Informatics [19, 20, 21]. Along with the improvements in this area, in 1972, biomedical groups emerged in Ribeirão Preto, such as the Department of Physiology, where Renato Sabbatini and his group began studies in applications of the analysis of physiological data and simulations applied to research in databases with the new HP technologies [22, 23, 24].

In 1986, the first recognition of the degree of national development was achieved, through a seminar on Informatics in Health held in Brasília, proposed by the Ministry of Health. Then, later that year, during the First Brazilian Congress on Health Informatics organized by Dr. Renato Sabbatini, the Brazilian Society of Health Informatics was founded. In addition to this, the next milestone in this area, still in 1986, was the publication of the journal on the theme of Medical Informatics, authored by Renato Sabbatini and José Raimundo Sica [5, 25].

12.2 Advantages of Innovation in Medical Informatics

Innovations in the health area are already a reality and are advancing every day with a positive impact. These innovations bring with them a series of benefits, both for patients and for professionals in the sector. Some advantages are described in the following subsections [15, 22, 26, 27, 28].

12.2.1 Integration of Information

It is possible to gather all the important information about a patient in an electronic medical record, stored in the cloud, in a way that all the people involved in their treatment have access to this information, even remotely, optimizing the work performed by the medical team [29].

12.2.2 More Accurate Diagnostics

With the improvement of machines and equipment used in exams, mainly imaging, it is easier to obtain a diagnosis, in addition to detecting more serious diseases even at an early stage, significantly increasing the chance of success in treatments [30].

12.2.3 Improved Surgical Techniques

New tools developed and the use of robots in surgeries provide greater precision and safety to the surgeon, in addition to a less invasive procedure, making the recovery of patients faster [31].

12.2.4 Error Reduction

By obtaining more accurate diagnoses and improving surgical techniques, the chance of an error occurring during the process decreases sharply [32].

12.2.5 Patient Autonomy

Devices and apps have been developed to help patients monitor disease at home and facilitate remote medical follow-up [33, 34].

12.3 Medical Informatics and the Covid-19 Pandemic

Within the context of the Covid-19 in the world, the topic of medical informatics became a subject to be developed further. Some of the areas of activity and even applications from the areas of study of medical informatics could be used as alternatives to this pandemic. Among them, we can mention telemedicine, which uses telecommunication and computer resources to carry out diagnostic procedures at distance [35] and virtual medical consultations that guaranteed the permanence and non-violation of the quarantine in times of Covid-19 [36, 37].

12.4 Types of Technology in Medical Informatics

12.4.1 Internet of Things

Among the innovative technologies that are already present in our reality, the Internet of Things (IoT) has a range of diverse applications in the field of medicine. Hospitals and technology companies have teamed up to apply this concept to the evolution of medicine [38].

Of the various innovations that IoT in the medical field can provide, we can mention: Digital records of exams with devices that generate data digitally, intelligent continuous glucose monitoring with equipment that monitors glucose levels in diabetics, smart hospital bed facilities, and other innovations [38].

The Internet of Things is a topic that is expected to be further developed in the future in the field of medicine, since, with the constant evolution of technology, digital devices tend to become even more connected, helping to capture patient data and other benefits [39].

12.4.2 Artificial Intelligence

With the explosion of big data, there was the need and also the desire to look for alternatives and solutions that could analyze this vast amount of data. The area of medicine used artificial intelligence with computers and algorithms to analyze this huge amount of data to find, in an easier way, solutions to the most diverse problems in this area [40].

Using artificial intelligence and its algorithms, the capture and collection of patient data, for example, through electronic medical records, and clinical exams, occur more quickly and also, after the data analysis stage, return solutions in the form of diagnoses for possible diseases and their probabilities of occurrence [41].

12.5 Processes in Medical Offices

Several methods can be used to simplify processes in medical offices, such as simplifying obtaining information from patients and ensuring the fluidity of communication. Some examples are discussed below.

12.5.1 Digital Transformation

Digital transformation, which is a process in which a company assumes a position as a digital business, is not a new term. Startups that combine medical services with technologies (health techs) appear to transform how hospitals, doctors, offices, and patients relate to each other. Technological solutions, the automation of processes, the improvement of the business model, and the guidance of actions focused on the user experience, for example, are possible [42, 43].

12.5.2 Process Automation

The trend in the health sector is to optimize day-to-day life through the use of tools and services, simplify office or clinic administration, and also providing a differentiated experience for the patient. And there is already complete software that helps in these processes. Processes that analyze the data flow, which crosses information, being able to perform data management, electronic medical records, financial services, medical marketing, telemedicine, and personalized agenda, among other methods of relationship with patients [44].

12.5.3 User Experience

It is essential to improve the communication channels from the office to mobile devices because nowadays, most of the population researches a certain subject on their smartphones. With this improvement, it is possible to sustain a good relationship between doctor and patient and also boost the business. Due to the coronavirus pandemic, remote consultations must be carried out, to ensure a better experience for users [7, 43].

12.5.4 Remote Service

In March 2020, a resource called telemedicine was regulated in the health sector, due to the coronavirus pandemic. This resource consists of consultations via video calls, through proprietary platforms, which aim to maintain a close relationship with the patient, in an efficient, safe, and private way for users. There are already free platforms for all doctors in Brazil, using advanced security protocols [8].

12.5.5 Audiovisual Content

The use of videos is a relevant tool when it comes to creating professional authority, educating, disseminating quality information, and bringing patient safety, as this helps with credibility, engagement with the target audience, and generation of trust in those who are involved [9].

12.5.6 Medical Marketing

The medical marketing strategy is still little used by physicians. The digital presence of health professionals is very important to attract, retain and bring patients closer together.

More and more people access the internet to find explanations, knowledge, and health information and, therefore, it is essential to be able to count on a qualified digital positioning [43, 10].

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