

Chapter 11

The Way to Smart Healthcare: A Comprehensive Research on Technology Assessment Methodologies for Digital Health Systems

Zeynep Tuğçe Kalender

 <https://orcid.org/0000-0002-9491-7252>

Marmara University, Turkey & Czech Technical University in Prague, Czech Republic

Özalp Vayvay

Istanbul Health and Technology University, Turkey

ABSTRACT

Digitalization of healthcare is not a new concept; however, nowadays the need for change has become obvious. The rapid increases in technological advancements in health and information technologies enable them to converge and develop in harmony with each other. Digital technologies are ubiquitous and aim to improve healthcare systems and allow new business models. From this point of view, selection and prioritization of them in order to keep up with the technological developments become vital. However, the allocation of resources to meet increasing demands is a multifaceted problem. In this framework, this study aims to analyze the way to smart healthcare. Therefore, initially, current technological implementations in health are reviewed. Afterward, the structure of health technology assessment models used in the selection of technology is detailed. Finally, the managerial strategies for administrative levels are presented in order to form the basis for further studies in this field.

INTRODUCTION

As in all sectors, there has been a rapid transition to the use of information technologies in the health sector. Along with developments such as digitalization in health, smart hospital, and electronic health applications, information technologies are used for many purposes such as ensuring the welfare of people, meeting the needs for health services easily, collecting and protecting health data from birth to death,

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transforming data into information and storing it, etc. The expectations and demands of the society for access to high-quality health services, on the other hand, the effort to limit the increasing costs of health services has increased the interest in the more appropriate use of health technologies.

In an expanded way, “Health Technology” can be defined as, all operations that need to be done for diagnosis, prevention, cure, rehabilitation, or long-term care of disease, all kinds of drugs, medical devices, medical or surgical applications methods, and all types of structures or systems used to provide health services. Today, “Smart healthcare systems” use the Internet of Things (IoT), Artificial Intelligence (AI), wearable devices, sensors, Big Data, Business Intelligence (BI), etc., or a combination of them to respond to the needs of the sector intelligently. While technological methods/ tools/ technologies for the digitalization of processes are increasing day by day, it brings with it the question of which technologies should be chosen as a priority.

In hospitals, the evidence-based information needed during the selection and evaluation of the requested new technology and sometimes even during the review of the use of existing technologies can be obtained with the health technology assessment (HTA) method. The HTA method is one of the tools frequently used in decisions about the acquisition of health technologies since technology evaluation practices are carried out in the decision-making process at all levels of the health system. However, the objective is not only to provide patients with better, more value-added and, more cost-effective healthcare. As these new technological breakthroughs enhance the healthcare experience, they also successfully improve the quality, flexibility, productivity, cost-effectiveness, and dependability of services.

Healthcare is one of the most anticipated areas in the 4.0 revolution to achieve great results. While other industries digitally transform and innovate extensively to benefit from these latest technologies, the healthcare sector has been also turning its attention to this area with a day-by-day increase. In this regard, smart healthcare systems in which information technologies, video telemedicine, remote patient monitoring, mobile health and, smart response systems are used together or separately to provide more coordinated and quality service to people who need treatment, are developed. This crystal clear situation of the sector and new circumstances lead this study to focus on, “In order to keep up with the developments, which technologies should be selected and how should the priorities be determined?”

Factors such as constantly renewed health technologies and an aging population increase the demand and costs of health services day by day. Therefore, all health systems face pressure to allocate scarce resources to meet ever-increasing demands and costs. Although there are some difficulties in smart health services, such as high initial investment costs, integration difficulties, cyber security threats and communication difficulties between rival systems, this system provides a healthier population, ensures a peaceful and happy life for citizens, and reduces medical costs, efficiency over the entire system is increased and inequalities in health indicators are reduced.

In this framework, initially, current technological implementations in health systems are reviewed in the following section to better highlight the road to Smart Healthcare. Afterwards, the structure of HTA models used by hospital administrators in the selection of technology is mentioned. The evolution of these models is examined briefly considering different dimensions. As it is a well-known fact that health systems are not deterministic, the system itself and each of the factors affecting the system are probabilistic and uncertain. The imperfect knowledge situation is inevitable thus, the data causes uncertainty in the decision-making process. From this point of view, in the following part(s) of the study, methods and strategies currently being applied are investigated with a special focus on uncertainty-based models and applications. Finally, the managerial strategies for administrative levels are presented in order to form the basis for further studies in this field.

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