

## Chapter 42

# Towards Telemedical Centers: Digitization of Inter–Professional Communication in Healthcare

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### ABSTRACT

*Over the years, the developments in computing science have strongly influenced the way healthcare entities maintain processes aimed at delivering adequate medical services to patients. Hospital information systems operating within internal computer networks have drastically helped hospitals to improve the efficiency of providing services. They have allowed an immediate sharing of medical information in digital form between hospital employees in order to undertake clinical decisions in a quicker and better way, and to eliminate errors caused by lower quality paper information. The equivalent to these systems in exchanging information between distant medical professionals has become telemedicine. Telemedicine has created opportunities for a smooth cooperation between dispersed medical units and for automating the management of healthcare processes at the regional and national levels. In this chapter, the authors discuss an emerging trend towards developing and maintaining telemedical centers at the institutional and regional/national levels. The authors present functional and organizational requirements for such centers, as well as technical conditions relating to their implementation. Recommendations and statements presented herewith are based on the authors' collective experience in building teleinformation systems for healthcare, which led to the development of the Wielkopolska Center of Telemedicine.*

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## INTRODUCTION

The ability to exchange information, opinions, and knowledge easily has always been a desire of medical professionals. This dream has led to a successful transmission of radiological images between distant locations in 1950s. The first medical teleconsultation was also performed over 50 years ago. In the end, these early experiments led to the establishment of telemedicine. A decreasing cost of telecommunication infrastructure and computer equipment allowed the emergence of protocols for saving and transmitting medical information in digital form. Along with the development of broadband computer networks in 1990s, it created a great opportunity for the implementation of solutions allowing a close collaboration and data exchange between remote medical centers and practices.

Today, telemedicine allows remote medical professionals in any medical discipline to communicate through digital means. Various technologies and solutions are used for various medical community needs: the main purpose of their use remains, however, enabling medical personnel to cooperate and thus increasing the quality of medical services delivered to patients. Ability to share patient information allows a vast increase in safety not only of patients, but also of medical personnel themselves. Not insignificant is also a reduction of costs stemming from a decrease in the number of unnecessary procedures performance, shorter hospitalization times or better utilization of scarce expert resources.

The above-mentioned solutions and technologies are being widely adopted by healthcare around the world. There exist regions and countries where digital communication is the basis of the currently operating public healthcare systems. Important medical centers have also noticed the need for introducing advanced telemedical services in their practice to facilitate communication with cooper-

ating centers and units, and to reduce costs. Our observations of the telemedicine developments in recent years has led to a conclusion that telemedical centers will be widely developed, either by leading medical centers at the institutional level or at the regional/national level as a part of a new model of a public healthcare system. We are in final stages of the development process of such a center in the region of Wielkopolska, Poland. In the Wielkopolska Center of Telemedicine, apart from enabling communication between medical professionals in consultation scenarios, the idea is to complement these processes with knowledge sharing in teleeducational and clinical decision support scenarios. The project aiming to establish the Wielkopolska Center of Telemedicine is supported by a grant from Iceland, Liechtenstein and Norway through the EEA Financial Mechanism.

This chapter is organized as follows. First, in the Background section, we present the current state of solutions for digital communication and cooperation of medical professionals, and how telemedical centers emerge in various institutions, disciplines, regions, and countries. In the next section we discuss technological and organizational issues of creating a comprehensive telemedical center. Finally, in the Future Research Directions section, we outline challenges for the further development of institutional and regional/national telemedical centers related to integrating patients and biomedical knowledge bases in the health monitoring, diagnostic decision making and therapy planning. We summarize the discussion on creating telemedical centers in the Conclusion subsection.

## BACKGROUND

A traditional way of communication between distant medical professionals involves several dimensions of medical information exchange.

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