Chapter 1

Introductory Chapter: Telemedicine

Thomas F. Heston

1. Introduction

The practice of telemedicine creates opportunities for greater access to medical care, improved access to medical specialists, and greater convenience for patients, all at a potentially lower financial cost. With the global expansion of the Internet via cable, fiber optics, satellites, drones, and even high altitude balloons, telemedicine services can reach every individual on Earth with a smartphone.

2. History of telemedicine

Telemedicine in its earliest form began with the advent of the telegraph in 1844 and the telephone in 1876, which allowed patients to summon physicians quickly and increased the availability of physician-to-physician consultations [1]. During the American Civil War, the telegraph was used to transmit casualty lists and request medical supplies. After the telegraphy, telephones were developed and became the primary means of remote medical communication. The use of portable radios became common starting in the early 1900s. The National Aeronautics and Space Administration (NASA) revolutionized long-distance communications in the mid to late 1900s by developing systems to both communicate with and monitor the health of astronauts. With increasing technology including computing and telecommunication over the Internet, telemedicine has grown to include real-time remote consultation from medical specialists, remote access to medical imaging, home monitoring of patients, and increased availability of patient as well as physician medical education resources [2].

3. Current status

Applications of telemedicine continue to grow rapidly. Current applications have advanced to the point that in addition to physicians monitoring patients remotely there are artificial intelligence systems using smartphones and wearable applications to monitor patient health [3]. Not only does telemedicine allow advanced verbal communication between physicians and patients, it also enables physicians to conduct a physical exam of patients remotely and to even conduct surgery over long distances using telerobotic systems [4].

4. Future developments and challenges

Telemedicine attempts to replicate the patient-to-doctor relationship in a realistic, productive manner. Transmitting sensory data over the Internet presents a primary challenge to the practice of telemedicine [5]. Lack of awareness and experience with the technology, along with uncertainties over how telemedical

services will be reimbursed, have limited the expansion of telemedicine in spite of its great promise [6]. In addition, the quality of medical services offered over some commercial telemedicine services can vary widely. For example, one study looking at the medical diagnosis and management of skin disorders via telemedicine found that several diagnoses were consistently missed (secondary syphilis, eczema herpeticum, Gram-negative folliculitis, and polycystic ovarian syndrome) and common diagnoses that were correctly made were often incorrectly treated [7]. Familiarity with technology and comfort with the use of smartphones and healthcare apps also appears to be a primary challenge facing the implementation of telemedicine. For example, Millennials, who have grown up with the Internet and smartphones, are much more interested in using healthcare apps and telemedicine services compared to baby boomers [8]. As technology becomes more user-friendly, people become more comfortable with technology, and as smartphones become widely available, telemedicine will continue to show rapid development. The authors in this book on telemedicine are leading the way!

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