Telemedicine in Cardiovascular Diseases

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Telehealth and telemedicine, if properly used, may offer advantages for both patients and health professionals. As per the World Health Organization (WHO), telemedicine can be defined as “the delivery of medical services, where distance is a basic factor, by all medical care experts utilizing information and communication technologies (ICT) for the exchanging of adequate information for the treatment, diagnosis and avoidance of illness and wounds, exploration and assessment, and for the proceeding with instruction of medical care suppliers, in the purpose of strengthening individuals health and their networks”. Telemedicine includes the protected transmission of clinical information and data, by voice, text, images, or other forms required for the diagnosis, treatment, and patient follow up.

Keywords: telemedicine ; cardiovascular diseases ; telecardiology ; personal care ; remote consultation

1. Introduction

In recent years, there has been a growing interest in the development of precision medicine approaches in the prevention and treatment of several pathologies with the purpose to offer to patients “the right treatment, to the right patient, at the right time”. In cardiovascular medicine, the potential of precision medicine applies to all stages of disease development and includes risk prediction, preventative measures, and targeted therapeutic approaches [1]. Telehealth and telemedicine enable precision medicine by two routes following data review by a doctor. These include a direct (online) discussion between a patient and doctor regarding a therapy (e.g., change dosing, prescription renewal) and prescriptions to the patient for them to undergo more precise testing and assessment. In both cases, the online session may add information or data to the patient history.

Telehealth and telemedicine, if properly used, may offer advantages for both patients and health professionals [2]. As per the World Health Organization (WHO), telemedicine can be defined as “the delivery of medical services, where distance is a basic factor, by all medical care experts utilizing information and communication technologies (ICT) for the exchanging of adequate information for the treatment, diagnosis and avoidance of illness and wounds, exploration and assessment, and for the proceeding with instruction of medical care suppliers, in the purpose of strengthening individuals health and their networks” [3]. Telemedicine includes the protected transmission of clinical information and data, by voice, text, images, or other forms required for the diagnosis, treatment, and patient follow up.

The telemedicine field applied to CVD is defined as telecardiology [4]. Personal medications or treatment can be suggested over video or phone conversations with the pill dispenser at hand. Family members or friends (from different locations) can participate in these visits and understand expert suggestions for improving the health literacy of the entire family. On the other hand, patients can remain at home with comfort, which allows welcoming talks with more involvement in decision making about their cardiac health, e.g., monitoring of blood pressure by taking acute readings with home devices. Frequent telemedicine visits can allow doctors to encourage patients to perform BP checkups. Studies have shown that self-observation improves both BP estimations and medicine adherence [5][6]. Moreover, hypertension is also an ongoing illness that stands at risk of CVDs and benefits largely from successive telehealth visits.

2. Current Insights on Telemedicine in Cardiovascular Diseases

The use of telemedicine as a support to cardiology was introduced more than 100 years ago in Australia with the use of the telegraph from Barrow Creek Telegraph Station. In 1905, Einthoven transmitted electrocardiographs using the telephone line. A further evolution of this experience dated in 1910 with tele-auscultation transmitted through the telephone lines. In 1935, the first tele-electrocardiographic service was established in Lviv in the Ukraine. In 1938, the International Radio Medical Center (C.I.R.M.) in Rome received by radiotelegraphy an electrocardiogram from a passenger ship. In the last 10 years of the last century and at the beginning of this century, telemedicine started to move from the experimental phase to large-scale experiences, and its practical applications related to cardiology are entering in the standards of medical practice.

In this systematic review, we attempted to understand the positive effects of telemedicine and telehealth technologies on controlling cardiovascular diseases. The assessment of articles incorporated in this study explained that each article obeyed the NOS quality checklist and scored at least 7 (NOS ≥ 7), indicating scientific rigorousness of the study selection. In addition to highlighting the telemedicine effectiveness in CVD management, this work described the recent advancements in the last decade. Through this work, the key aspects of telemedicine in terms of evaluation of its role in the perspective of CVD personal care were identified. We found 19 quality research studies from Australia, China, France, Italy, Netherlands, and the United States, among others.

During serious pandemics such as COVID-19, a huge decrease in hospitalization and expanded self-administration by patients embodies the financial discernment of telemedicine since it can decrease patient flow to hospitals. Telemedicine has provided a chance to see remote patients, which has helped doctors in checking and monitoring conditions that the patient or their close family can easily follow. Those patients infected with COVID-19 are commonly associated with hypertension, CVD, and diabetes. In this pandemic, there have been other situations raising concern for the personal safety of patients who are at high risk for CVD. In such cases, the adoption of cardiac rehabilitation techniques is mandatory, including cardiac rehab in a home, which can guarantee the continuity of these mandatory services [7].

The effect of technological advancements on financial issues in healthcare has exceptionally exposed the divergence between the innovation cost and the change (either increase or decrease) in medical resource utilization because of the clinical impact of this technology. For instance, current telemedical technologies can provide personal care to cardiac arrest patients, certainly amplifying the treatment costs in long-term care for stroke survivors. The difference in quality and cost gained has been highly influenced by the cost-effectiveness of telehealth technologies in the prevention of cardiovascular diseases. We identified two studies that mentioned the development of telemedicine tools, namely, the consumer navigation of electronic cardiovascular tools (CONNECT) [8] and a novel system based on mobile internet, cloud computing in management of hypertension, and experts in the monitoring of physical activity among heart disease patients [9]. These tools need to be enhanced to function for long-term care, and a time framework should be designed to estimate the quality of care of CVD risk patients.

However, most of the available literature associated with clinical trials and pilot projects provided short-term results. A few were associated with long-term usage of telemedicine in CVD care [10][11][12][13]. Some clinical trials reported the efficacy of telemedicine rather than effectiveness [14][15][16][17][18]. One study presented a community-based survey of CVD risk factors to evaluate the potentiality of telemedicine [19], and another study reported follow-up data of CVD patient health status or clinical outcomes who participated in telecardiology services [20]. Other reports on telemedicine involvement in CVD care produced a strong assumption regarding the possible benefit to health status monitoring although the availability of limited patient administrative data.

According to the literature, telemedicine has the benefit of saving time and providing personal care for the patient. Physicians have to consider the shortcomings of these technologies, whereas telemedicine could be expensive for hospitals or small healthcare centers to provide. Simultaneously, if the patient prefers direct visits to a doctor, telemedicine is not an ideal solution. Therefore, the doctor has to maintain bonding with a patient to make them comfortable with the new technologies. We also have to consider the fact that no service is perfect, and telemedicine is no exception. Studies have continuously proven that telemedicine can save money, time, and lives.

3. Conclusions

The overall findings of this work highlight the importance of telemedicine and telehealth technologies in the management of personal care among CVD patients. Moreover, they provide evidence of the benefits of cardiovascular care when using telemedicine in developed nations. Many studies are available on telemedicine applications, but sophisticated qualified studies are still very few, and the generalization of most evaluation outcomes is rather limited. However, one positive finding is that the world is now understanding the importance of these technologies because of significant challenges introduced by COVID-19. There has at least been a start in some developing countries, with public bodies ready to improve the economic situation through the adoption of telemedicine. We strongly suggest future developments for the provision of medical services through telemedicine, along with necessary training for both patients and providers, thus resulting in better healthcare and enhanced patient satisfaction.

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