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Telecardiology and Digital Health for Cardiac Care During COVID-19 Pandemic: Opportunities and Precautions

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Abstract

The COVID-19 pandemic has provided a substantial impetus for the rapid expansion of digital health services worldwide. With the rule of social distancing and quarantine following the outbreak of Coronavirus infection in many countries, special attention has been made to telecardiology as one of the best alternatives to traditional in-person cardiac care. The imposition of unprecedented restrictions on close encounters in almost all sectors, including health care necessitated the expansion of telemedicine and digital health in cardiology services (telecardiology). This paper highlights the benefits and potential risks of the rapid adoption of telecardiology and other digital health solutions for the management of patients with chronic cardiac conditions such as heart failure.

Keywords: COVID-19, Coronavirus, Telecardiology, Telemedicine, Digital Health, Cardiovascular Diseases

1. Introduction

The number of confirmed cases of Coronavirus disease 2019 (COVID-19) exceeded 11.6 million worldwide as in July 2020, and it is still on the rise. There are several uncertainties about the pathophysiology of this disease, how the pandemic is going to evolve in the future, and when an effective vaccine is going to be available, if any (1). Recent studies show that the severe form of COVID-19 is more prevalent among the elderly population and chronic patients (2). People with chronic heart diseases, especially comorbidities such as diabetes or respiratory diseases, are at higher risk of complications and mortality when infected by Coronavirus (3). These patients are usually at a higher need of healthcare and, therefore, are theoretically more predisposed to virus infection. It is also evidenced that COVID-19 is associated with a higher prevalence of cardiovascular diseases (4). The findings of a recent study revealed that about 7% of COVID-19 patients develop myocardial injury as a result of the infection (5).

Conventionally, the provision of healthcare for cardiovascular patients requires physical contact between the healthcare providers and patients, in particular for diagnostic and rehabilitation purposes. Such physical encounters are discouraged by the rules of social distancing (and physical distancing) during the COVID-19 crisis in both inpatient and outpatient settings to minimize the risk of infection spread. Several risk factors, including timing, type, and duration of exposure, can contribute to the cross-contamination of Coronavirus during in-person visits (6). One of the proven solutions for the provision of healthcare at a distance is the use of information and communication technology, which is generally referred to as telemedicine. A clear benefit of using telemedicine in epidemics is keeping non-infected chronic ill people away from places with a high risk of infection, such as hospitals and health centers (7). Digital health, which is a broader and more recent concept of using digital technologies in healthcare, offers other possible benefits such as opportunities to monitor the condition and manage infected people remotely using smartphones, wireless sensors, and wearable devices whilst they are staying at home (8, 9). This can remarkably decrease the relatively high risk of cross-contamination among healthcare providers who manage COVID-19 patients (10). Overall, the use of expanded and optimized digitally-enhanced health care can contribute to diminishing the risk of infection for both patients and healthcare providers. At a higher level, digital technology can transform traditional public health practices, including surveillance, detection, monitoring, and prevention, for combat-

ing COVID-19.

2. Arguments

Telecardiology, which refers to the use of telemedicine in cardiology services, is often associated with the management of people with heart diseases at home, healthcare centers, or general hospitals by specialist clinicians (11). Three main aspects of using telecardiology for the clinical management of cardiovascular diseases, which are quite helpful for the provision of such services for COVID-19 patients, are discussed in the following.

2.1. Benefits

Telecardiology allows for the remote evaluation of patients with acute cardiac illnesses from an ambulance or emergency room in general hospitals that otherwise have seldom access to timely cardiac interventions. Furthermore, it provides access to other services remotely (such as teleconsultation, teleECG, monitoring of vital signs, etc.) for specialists working from tertiary hospitals (12). Nevertheless, there are other situations in which telemedicine can help with the management of people with cardiac diseases. Patients with chronic conditions may benefit from personalized communication with their healthcare providers, either from specialized units or from primary care centers. The main benefit is to keep patients who are not in immediate need of visiting a clinician away from hospitals and healthcare centers. Digital health enables patients to communicate with their health professionals (nurses, GPs, cardiologists) from home via smartphones, tablet computers, or desktop computers. In this way, extending telecardiology services to the use of more advanced digital technology products such as wireless sensors and wearable devices will allow for the provision of customized outpatient care, including the delivery of digitally-enhanced or online cardiac rehabilitation programs. Therefore, telecardiology can be seen as a subset of a broader concept called digital health, which is naively defined as the use of digital technologies for improving the efficiency of healthcare delivery and making medicine more precise and personalized (9).

2.2. Precautions

The clinical management of conditions such as chronic ischemic cardiomyopathy and heart failure, chronic arrhythmia (using pacemakers and other remote electrocardiography devices), heart valve disorders, and congenital heart diseases may theoretically benefit from the implementation of digital health systems. In addition, many electronic medical record systems now offer virtual encounter functions (e.g., video consultations). Digital health can facilitate inter-professional consultation and communication between patients and clinicians, as well. However, not all the theoretical benefits for the implementation of digital health in real clinical practice have been proven in practice. Thus, in the rush of adopting technology for the management of patients with cardiac diseases, clinicians should be mindful of several controversial issues such as the necessity of in-person visits for a proportion of patients and low digital health literacy of a group of people (13). Undoubtedly, there is still a relative lack of evidence that new technologies will show improvement in health outcomes. Despite positive findings of several systematic reviews and large-scale clinical trials on the benefits of telemedicine, many authors call for more robust research studies, both quantitative and qualitative, for assessing the long term impact of such interventions (14, 15). It is also crucial that digital health interventions be properly evaluated according to the level of maturity of the new intervention (16).

2.3. Research and Development

From a consumer perspective, there has been traditionally a lack of participation of patients in the design and development of digital health interventions. To maximize the uptake and acceptability of digital health, researchers should involve patients and health care consumers in the development of digital health systems from the early stages (17). Most of the evaluation studies on telecardiology have evaluated the feasibility and efficacy of interventions, and a lower proportion of the studies have focused on the challenges and barriers to the adoption of such interventions. Moreover, for the result of evaluations to provide insights into the ways of improving the adoption of telecardiology, it has been recommended that studies follow the principles of realist evaluations (18). Under the realist lens, we propose that the evaluation framework of every telecardiology intervention should address five major aspects: (1) Service users (e.g. continuity of care, inclusive care, accessibility, and potential risks to patients); (2) service design and innovation (e.g. empowering local service managers and communities, service integration); (3) workforce (recruitment, retention, education, and training); (4) technology itself (e.g. compatibility, usability); and (5) stakeholder engagement (e.g. government agencies, private health and care providers, universities). This framework should identify how the rapid expansion of a proposed telecardiology intervention might provide benefit to the users, and how potential harms can be avoided. From the initial evaluation, we should be able to offer suggestions, e.g., on how the current systems might

respond to the challenges and use this opportunity to improve the provision of health and care services in our current environment (19). The establishment of rapport between a healthcare provider and the user has been named as one of the most important determinants of acceptance of any telemedicine program. The most dominant facilitators in the uptake of telemedicine programs have been identified as communication, motivation, integration into care, the involvement of stakeholders, availability of resources, and user-friendliness (17).

3. Conclusions

A) Although telemedicine is basically a technology-based initiative, the human factor plays an important role in the success of such programs. Neglecting human factors, in both patients and healthcare providers, has been reported as one of the main reasons for the failure of telecardiology services.

B) The readiness of health care providers is also very important in providing telemedicine services. For example, during the COVID-19 epidemic in the United States, although people were interested in receiving telemedicine services and searched the Internet for finding such services, the health system was not ready to provide these services to different groups of patients (20). Research has revealed several factors responsible for poor uptake of telemedicine in heart failure, including patient factors, staff factors, technical factors, team/service factors, governance and regulatory factors, and financial/business factors (17).

C) Pandemics such as COVID-19 pose major challenges to health systems, but at the same time, in some ways, they provide opportunities for expediting the adoption of digital technology in routine clinical practice. Digital health has reduced the number of patients showing up in-person for their outpatient appointments by offering a range of remote consultation services (21). Therefore, the COVID-19 pandemic will most likely facilitate the wider implementation of telecardiology and probably accelerate the process of the digital transformation of cardiac care in many countries.

Footnotes

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