 doi:10.20944/preprints202207.0116.v1

Essay

Pros and Cons of Telemedicine—Implications in Cardiology and Cardiovascular Medicine

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Abstract: The COVID-19 pandemic has highlighted the vitalness of telehealth in our medical world, where considering a restructuring of healthcare services has become paramount. In fact, telemedicine has recently earned a valuable place in many specialties; and its implications in cardiology and cardiovascular medicine were among the leading interests. In this letter, we gathered previous evidence supporting the merit of telemedicine in the fields of cardiology and cardiovascular medicine—medical branches in which patients require meticulous care and continuous monitoring—as well as protrusions of concerns about the uncertainty regarding the efficacy of telemedicine's future implications and technologies. In sum, in the context of this still on-going pandemic, medical institutions must strive to improve telehealth technologies and implement solid future research directions in this growing field—to be able to persevere in meeting the needs of the patients. As long as no conclusive evidence exists regarding the fields where telemedicine is most worthwhile, healthcare systems will always keep the dread of wasting resources on developing ineffective programs. We conclude that telemedicine has been attributed a considerable attention in managing cardiac and cardiovascular conditions; nevertheless, further studies with solid designs are still needed to confirm its validity and utility in those specialties.

Keywords: telehealth; remote assessment; cardiology; cardiovascular diseases; COVID-19

1. Introduction

The COVID-19 outbreak has given rise to a worldwide crisis, placing the world in quarantine and imposing social distancing. This pandemic has also generated an overabundance of challenges to the different domains of medical care, as healthcare systems were forced to handle a plethora of positive COVID-19 cases as speedily as possible, shifting their priorities to hospitalize and treat critically ill patients and restraining clinical in-person consultations to strict emergencies. Consequently, both physicians and patients had to adapt. Thus, the pandemic highlighted the vitalness of telehealth in our medical world, where considering a restructuring of healthcare services has become paramount [1].

In fact, lately, virtual tools—such as internet-based research and advanced technologies of videotelephony—have gained in promotion during the pandemic and showed substantial advantages, which might make them surpass in-person monitoring—even post-pandemic. Indeed, telemedicine has been praised for limiting unnecessary traffic in clinics, prioritizing urgent cases and speeding their access to healthcare professionals. Besides, telemedicine is particularly helpful in surmounting geographic distances, especially for patients presenting physical disabilities [2,3]. Further advantages reside in the economic evidence for the cost-saving character of telehealth [4]. Nonetheless, this level of convenience is not devoid of disadvantages, which include—but are not limited to—an effacement of boundaries around physicians' personal life, a rise in health disparities since some people lack proficient access to internet/digital devices, a potential overprescription/overuse of medicines and medical services, and an inability to perform complete

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physical examinations—thus occasioning misinterpretations and misdiagnoses of medical conditions. Moreover, through remote assessment, patients and physicians lose the opportunity to have in-person interactions, which might impact the doctor-patient communication and hinder the establishment of a trust relationship between the two, hence impeding "patient-centered" confidential discussions and medical confessions [2,3]. Therefore, it has long been questioned whether telemedicine can deliver the same "patient-centered" outcomes (e.g., reducing mortality, improving functional status, etc.) as "traditional" face-to-face assessments, but at a lower cost [5].

However, telemedicine has recently earned a valuable place in many specialties; and its implications in cardiology and cardiovascular medicine were among the leading interests [4]. In this letter, we gathered previous evidence supporting the merit of telemedicine in the fields of cardiology and cardiovascular medicine—medical branches in which patients require meticulous care and continuous monitoring—as well as protrusions of concerns about the uncertainty regarding the efficacy of the presented technologies.

2. Telemedicine and Arrhythmias

Firstly, a major well-known concern in cardiology is the patients' unwillingness to have frequent medical visits, which makes them reluctant towards routine electrocardiograms (ECGs). In addition, some heart conditions, particularly arrhythmias, tend to be paroxysmal and thus hard to detect on routine ECGs during outpatient consultations. Although practitioners may benefit from implantable loop recorders (ILR) and ambulatory monitors to establish their diagnoses, these methods are expensive and invasive. Another major limitation is the inaptitude to provide real-time access to ECG recordings [6]. Therefore, several studies aimed at validating the use of remote technologies, such as smartphone enabled ECG devices, to diagnose and monitor cardiac conditions. For instance, Nguyen et al. conducted a 1-year-period study to assess the utility of ECG tracings provided by a wireless mobile health (mHealth) device in a pediatric population with established diagnoses of paroxysmal arrhythmias (i.e., supraventricular tachycardia, atrial tachycardia, ectopic atrial tachycardia, and atrial fibrillation). The results, analyzed by pediatric electrophysiologists, supported the usefulness of smartphone-enabled ECG devices in generating high-quality diagnostic tracings in children [7]. Likewise, Gropler et al. reinforced those findings, demonstrating the utility of mHealth devices that produce a single lead ECG tracing in detecting atrial fibrillation among children and adolescents. Further, when compared to standard 12-lead ECGs, these mobile applications were found to be accurate and thus able to serve for ambulatory ECG monitoring [6]. Most recently in 2021, the mHealth Screening to Prevent Strokes (mSToPS) clinical trial showed that screening older adults for atrial fibrillation yielded reduced rates of clinical events (i.e., systemic embolisms, strokes, myocardial infarction, or death) over a period of 3 years after the initial screening, knowing that the screening was performed via ambulatory ECG skin adhesive patches that keep recording electrical signals from the wearer's heart for 14 days and save a continuous ECG tracing [8].

3. Telemedicine and Heart Failure

In addition, when contrasted to usual care, telephone support/telemonitoring were found to diminish hospitalizations and death among heart failure patients [9,10]. For instance, a Chinese clinical trial evinced the effectiveness of telehealth exercise training as an alternative way for cardiac rehabilitation in patients with heart failure [11]. Further, since most of the hospital readmissions due to heart failure could be prevented, and given that non-adherence to prescribed self-management constitutes the main identified factor, targeted efforts to enhance self-care in heart failure patients should be deployed in order to reduce readmissions; for this purpose, it was thought that self-care would be promoted by implementing a remote tracking system and constantly sending reminders via mobile health devices. Hence, a study tested the applicability of a remote tracking regimen, while evaluating patients' willingness to adhere to programs that incorporate wireless sensors

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and patient-reported outcome measures. However, the results showed that patients were likely to wear activity trackers but unlikely to use pill bottles or fill outcome surveys [12].

4. Telemedicine and Cardiovascular Risk Factors

On another hand, remote assessment of major cardiovascular risk factors, specifically hypertension, obesity, dyslipidemia, and diabetes mellitus, has also been a subject of great interest. A recent examination of telemedicine interventions for blood pressure management in low- and middle-income countries discovered that systolic/diastolic blood pressure was significantly improved among the interventional groups. Nonetheless, no substantial health benefits were yet to be found; additionally, the included studies had several limitations, such as interventions' disparity, short durations, and small samples [13]. Consistently, another meta-analysis found that mobile health interventions using smartphone applications (e.g., mHealth app interventions) had no effect on serum lipids, blood pressure, or obesity/weight. Moreover, those apps showed only moderate benefits regarding self-management in patients with type 2 diabetes mellitus [14]. However, a recent review concluded that telehealth interventions detain the potential of improving glycemic control in diabetic patients, while also promoting patients' diet quality, physical activity, and mental health; helping patients manage pain; and reducing the rates of hospitalizations and mortality related to chronic heart failure [15]. It has also been suggested that digital "remotely-delivered" behavioral counseling programs (e.g., how to reduce excess body weight and how to delay the onset of morbidities) are performant and cost-effective in helping overweight/obese seniors who are at risk for diabetes mellitus and cardiovascular diseases [16].

5. When Telemedicine Appears to be Abortive

Besides, a randomized control trial compared patients after stroke who received additional caregiver-mediated "e-health support after stroke" exercise programs to patients who exclusively took the usually given care. As increasing the duration of exercise after stroke enhances the functional outcome and eases early discharge, it was predicted that patients benefiting from task-specific remote training would have better health outcomes. However, no significant disparities were found between the two groups in terms of self-perceived mobility, duration of hospitalization, and secondary functional outcomes (i.e., walking ability, strength, balance, fatigue, quality of life, etc.); in reality, the only favorably impacted outcome in the interventional group was the moods of patients and caregivers [17]. Additionally, a systematic review provided evidence that although digital techniques give the opportunity of enhancing healthy behaviors (e.g., healthy diet, adherence to medications, and physical activity), they appear to be impotent in delivering improvements of deleterious behavioral determinants (e.g., smoking or alcohol use) or health outcomes (e.g., blood pressure, hyperlipidemia, etc.) [18]. Further, older patients, who hold the highest risks for cardiovascular diseases, commonly present visual and cognitive impairments, hence hampering the utilization of advanced telemedicine technologies [19].

6. Challenges of Telemedicine and Final Thoughts

In short, the effectiveness of telemedicine in delivering good care is somewhat controversial in some diseases and certain specialty areas [15]. As long as no conclusive evidence exists regarding the fields where telemedicine is most worthwhile, healthcare systems will always keep the dread of wasting resources on developing ineffective health programs [5]. In fact, a recent study conducted in Netherlands highlighted a high cost of uncertainty concerning reimbursing telehealth interventions, such as nurse telephone support and home telemonitoring used for managing chronic heart failure patients [20]. Therefore, additional research seems to be meritorious, in order to validate the efficacy of telemedicine in enhancing health outcomes among cardiac patients. In other words, such research should not be limited to the evaluation of the practicability of programs, their cost-effectiveness, or the caregivers/patients' experience/satisfaction [12,21]. Proving the

health value of telemedicine's future implications is crucial to guide to a well-grounded implementation of practical interventions [5].

In sum, in the context of this still on-going pandemic, and in order to keep adjusting for the "new normal", medical institutions must strive to improve telehealth technologies and implement solid future directions in this growing field—to be able to persevere in meeting the needs of the patients. We conclude that telemedicine has been attributed a considerable attention in managing cardiac and cardiovascular conditions; nevertheless, further studies with solid designs are still needed to confirm its validity and utility in those medical specialties.

Conflicts of Interest: The authors declare no conflict of interest.

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