

Telemedicine during coronavirus disease-19 pandemic: a paradigm shift in cardiovascular care

La telemedicina durante la pandemia del COVID-19: un cambio de paradigma en la atención cardiovascular

Atul Kaushik^{1*}, Kuldeep Singh², Surendra Patel³, Jai Bharat-Sharma¹, Surender Deora¹,
Rahul Choudhary⁴, and Akhil Dhanesh-Goel⁵

¹Department of Cardiology; ²Dean Academics; ³Department of Trauma and Emergency Cardiothoracic Surgery; ⁴Department of Trauma and Emergency Cardiology; ⁵Department of Community Medicine and Family Medicine, All India Institute of Medical Sciences, Jodhpur, Rajasthan, India

Abstract

Introduction: Severe acute respiratory syndrome due to coronavirus disease (COVID-19) has overwhelmingly affected the health-care systems globally. Delivering cardiovascular care has become unusually difficult both for caregivers and physicians in these unprecedented times. **Methods:** We briefly reviewed how cardiac care can be delivered to patients while limiting the exposure of both patients and healthcare workers through telemedicine services. We made a comparison at our institute of outpatient services through routine and telemedicine visits. **Results:** We found that telemedicine can be an equally effective alternative cardiac care during the times of pandemic with no significant difference in patients profile admitted through telemedicine services. **Conclusions:** We concluded that telemedicine can prove to be an effective tool in delivering cardiac care by limiting exposure of both patients and physicians with better triage of cardiac patients in the situation of COVID-19 pandemic and may complement to regular cardiac care in routine times.

Key words: Telemedicine. Coronavirus disease-19. Cardiovascular care. Pandemic

Resumen

Introducción: El síndrome respiratorio agudo grave dado por el COVID-19 ha afectado de manera abrumadora a los sistemas de salud a nivel mundial. La prestación de servicios de atención cardiovascular se ha tornado inusualmente difícil tanto para los cuidadores como para los médicos en estos tiempos inéditos. **Métodos:** Realizamos una revisión breve de cómo se puede brindar atención cardíaca a los pacientes a la vez que se limita la exposición tanto de pacientes como del personal de la salud a través de los servicios de telemedicina. Comparamos los servicios ambulatorios habituales con las visitas de telemedicina en nuestro instituto. **Resultados:** Encontramos que la telemedicina puede ser una alternativa igualmente efectiva de atención cardíaca durante tiempos de pandemia, sin ninguna diferencia significativa en el perfil de los pacientes ingresados a través de los servicios de telemedicina. **Conclusiones:** Concluimos que la telemedicina puede convertirse en una herramienta efectiva para proporcionar atención en salud cardíaca al limitar la exposición tanto de pacientes como de médicos con un mejor triaje de pacientes cardíacos en el contexto de la pandemia por COVID-19, y puede llegar a ser un complemento de la atención cardíaca habitual en tiempos normales.

Palabras clave: Telemedicina. COVID-19. Atención cardiovascular. Pandemia

Correspondence:

*Atul Kaushik

E mail: golu.09@gmail.com

Date of reception: 09-08-2020

Date of acceptance: 22-09-2020

DOI: 10.24875/RCCAR.M21000061

Available online: 18-10-2021

Rev Colomb Cardiol. 2021;28(4):319-323

www.rccardiologia.com

0120-5633 / © 2020 Sociedad Colombiana de Cardiología y Cirugía Cardiovascular. Published by Permanyer. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

Severe Acute Respiratory Syndrome due to novel coronavirus, also known as Coronavirus disease (COVID-19), was first reported from Wuhan, China in December 2019 and was declared as a global pandemic by the World Health Organization (WHO) on March 11, 2020¹. The pandemic since its outbreak has overwhelmingly challenged the health-care systems managing both COVID and non-COVID cases. In such a situation, providing adequately monitored and proper treatment and care to cardiac patients has increasingly become difficult. Tele health-care services acknowledged but underutilized for quite a long time may prove to be a safer yet optimal alternative for patients, caregivers, and healthcare workers in current times of mitigation and physical distancing.

Concept of telemedicine

Telemedicine is the utilization of medical information transferred remotely through digital communication to improve or promote the health of patients and is progressively gaining its role in today's practice in many areas, worldwide². It may include clinical care services, education services for patients and providers at home, or locally, identifying those who may require urgent or emergent admission to a facility and health-care administrative services concerning medical reimbursements³. Telemedicine and digital health can be utilized and serve the purpose of monitoring and tracking of patients using several ways such as the creation of virtual visits, chat applications, use of artificial intelligence for monitoring and surveillance of vitals and essential parameters for the management of chronic patients, wearable devices and creation of electronic intensive care unit (e-ICU) systems⁴. The healthcare using mobile digital communication tools may better triage the patients seeking consultation and may further increase the number of patients getting treatment while facilitating patient self-management and saving costs.

Telemedicine and current pandemic

A joint statement was issued by the American college of cardiology and American College of Physicians urging policymakers to understand the important role telehealth services can play in COVID-19 pandemic. This idea of virtual care can essentially limit community

spread while simultaneously allowing continuity of healthcare to patients. This has been adopted globally in the current situation through the creation of virtual chat stations where a health care worker (HCW) may assess, interact and triage the patients with limited exposure to both patients and HCWs. Virtual visits may defer actual visits and may keep stable patients away from potential exposure. Tele ICU or e-ICUs may allow physicians to critically monitor patients admitted remotely at different hospitals. Web technology can bring visitors to patients' rooms while reducing the visitor load at a hospital⁴.

Telemedicine and cardiovascular care: telemedicine involves consultation by telecommunications, generally for diagnosis or treatment of a patient at a site remote from the primary physician. It may include clinical care services, educative services for both patients and health-care providers at home, and health-care administrative services³. Telemedicine can also supplement as an effective tool to monitor, diagnose, treat, counsel, and rehabilitate patients especially when direct care is not feasible. Cardiovascular diseases (CVD), including coronary heart disease (CHD) and stroke, remain a leading cause of morbidity and mortality globally, with additional impact on economic and health resources on the management of CVD^{5,6}. The majority of acute CHD admissions and events occur in those who have had previous events. Telemedicine consultations may be a convenient and effective way to reduce lifestyle risk factors, timely prescription, and ensuring compliance to treatment and dietary advice and other preventive care for cardiac patients⁷. Jin et al. in their meta-analysis demonstrated telehealth delivered alone or in combination with traditional care and/or cardiac rehabilitation was effective in reducing rehospitalizations and recurrent cardiac events, cholesterol levels, and smoking status in cardiac patients⁸. Huang et al. in another meta-analysis compared telehealth based intervention versus center-based rehabilitation of coronary artery disease and concluded that telehealth intervention delivered cardiac rehabilitation did not have significantly inferior outcomes compared to center-based supervised program in low to moderate risk CAD patients⁹. Polinski et al. in a cross-sectional patient satisfaction survey found that between 94 and 99 % reported being very satisfied and around one-third of patients preferred a telehealth visit to a traditional in-person visit¹⁰. Telemedicine may also be a triggering aid for prompt activation of emergency care like activation of cath lab in case of acute

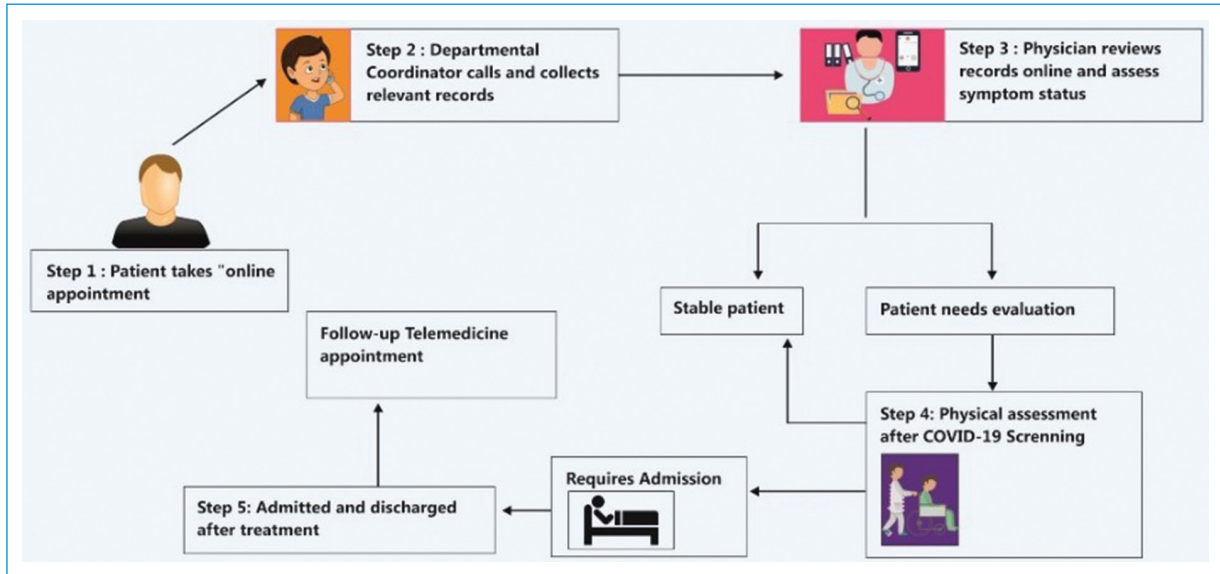


Figure 1. Workflow of our centre to provide Telemedicine Cardiovascular care.

Table 1. Comparisons of patient's profile offered through routine and telemedicine outpatient services

	June 16-July 15, 2019 (n = 1413 visits)	June 16-July 15, 2020 (n = 397 visits)	p-value
Cardiac diseases	987 (69.9%)	291 (73.3%)	0.18 ^a
Coronary artery diseases	781 (55.3%)	243 (61.2%)	0.03 ^a
Valvular heart diseases	126 (8.9%)	21 (5.3%)	0.019 ^a
Heart failure	80 (5.7%)	27 (6.8%)	0.396 ^a
Others	426 (30.1%)	106 (26.7%)	-
Total admissions through OPD services	92 (6.5%)	74 (18.6%)	<0.001 ^a
Interdepartmental references on outpatient basis	279 (19.7%)	110 (27.7%)	<0.001 ^a
New OPD visits for non-cardiac Issues	426 (30.1%)	5 (1.3%)	<0.001 ^a

a: Chi-Square test
OPD: outpatient department.

coronary syndromes as electrocardiogram done remotely can be directly transmitted through various web-based applications with a brief patient profile and thus preventing a delay in those who are in need, especially in times of lockdown and restricted travel.

Our center workflow and experience

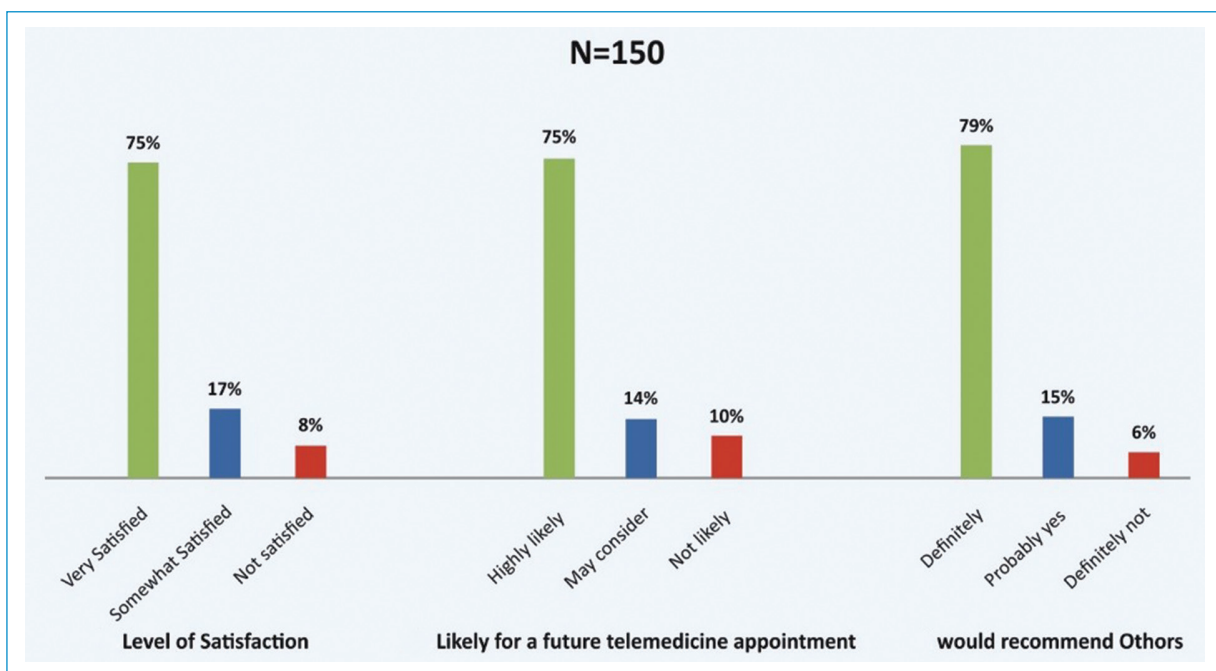
There have been several workflows and algorithms which have been tailored as per institutional protocols and availability of resources. We found our workflow

(Fig. 1) for telemedicine at a tertiary care center worth sharing as it was found to be rewarding in terms of providing cardiac care with limited exposure of both patients and HCWs. We made a brief comparison of patient care in routine times and through telemedicine, at the same time of the year for 1-month duration, that is, June 16-July 15 in 2019 (routine) and 2020 (telemedicine) to reduce any impact of seasonal variation or bias. We also excluded patients seeking care through emergency services (Table 1). The number of visits in the observation month reduced by

Table 2. Profile of patients admitted through routine and telemedicine outpatient services

	June 16-July 15, 2019 (n = 92 admissions)	June 16-July 15, 2020 (n = 74 admissions)	p-value
Cardiac disease	91 (98.9%)	73 (98.6%)	1.0
Coronary artery disease	81 (88.0%)	69 (93.2%)	0.300
Valvular heart disease	3 (3.3%)	1 (1.4%)	0.629
Heart failure	7 (7.6%)	3 (4.1%)	0.514
Others	1 (1.1%)	1 (1.4%)	-

p values calculated using Fisher's Exact test

**Figure 2.** Level of satisfaction, likeliness to have future appointment and recommendation to others by patient seeking cardiac care through telemedicine services.

3.5 times – from 1413 in 2019 down to 397 visits in 2020. Although the number of admissions was almost similar during the 2 time periods, the proportion of admissions were significantly higher during 2020 indicating that patients requiring admissions were more effectively scrutinized through symptom assessment through telemedicine. This is also corroborated from the fact that new Outpatient Department (OPD) visits for non-cardiac issues also significantly decreased from 30.1% in 2019 to 1.3% in 2020. Similarly, out of new OPD visits, the number of interdepartmental outpatient references requiring cardiology consultation

showed a significantly higher proportion in 2020. However, the numbers and profile of patients getting admitted were similar in the 2 time periods (Table 2). At the end of the day, patients were randomly called to assess the level of satisfaction, their willingness to avail telemedicine care in the future and recommending to someone else (Fig. 2). Of the randomly called 150 patients, 79% of the patients answered that they were very satisfied, 74% said they would definitely seek a future follow-up whereas 89% of the patient said they would definitely recommend telemedicine consultation to others. These findings showed a trend

towards more accessible cardiac specialized care through telemedicine.

Future implications

Telemedicine has emerged as a potential answer and reliable alternative in providing cardiac care during this time of pandemic and will definitely be integrated as a part of routine cardiovascular services in the future. It can lessen the healthcare burden by reducing unnecessary and unwanted consultations and can cater to chronic diseases by monitoring, counseling, and rehabilitative services, thus cutting down both overall cost and manpower allocations for management. It can also build up better physician and patient rapport with a paradigm shift toward patient-centered care rather than physician-directed treatment with reduction of physician's burn out level and improving compliance among patients who otherwise fail to attend routine clinics.

Conclusions

Telemedicine can lead to easy and wider access to specialized cardiac care with direct contact of a cardiologist with the patient and caregiver and can optimally triage those needing prompt intervention, monitoring, and adjustment of therapy, especially in times of physical distancing and mitigation. A perfect blend of routine outpatient and telemedicine consultation may widen the extent, access, and delivery of comprehensive cardiac care even in routine times.

Conflicts of interest

All the authors declare that there are no conflicts of interest for the publication.

Funding

The authors declare that there are funding for the publication.

Ethical disclosures

Protection of human and animal subjects. The authors declare that no experiments were performed on humans or animals for this study.

Confidentiality of data. The authors declare that they have followed the protocols of their work center on the publication of patient data.

Right to privacy and informed consent. The authors declare that no patient data appear in this article.

References

1. Guo Y, Cao Q, Hong Z, Tan Y, Chen S, Jin H, et al. The origin, transmission and clinical therapies on coronavirus disease 2019 (COVID-19) outbreak-an update on the status. *Mil Med Res.* 2020;7:11.
2. Richmond T, Peterson C, Cason J, Billings M, Terrell EA, Lee ACW, et al. American telemedicine association's principles for delivering tele-rehabilitation services. *Int J Telerehabil.* 2017;9:63-8.
3. Telehealth, Telemedicine, and Telecare: What's What? Federal Communications Commission. Available from: <https://www.fcc.gov/general/telehealth-telemedicine-and-telecare-whats-what>. [Last accessed on 2020 Jul 09].
4. Kapoor A, Guha S, Kanti Das M, Goswami KC, Yadav R. Digital healthcare: The only solution for better healthcare during COVID-19 pandemic? *Indian Heart J.* 2020;72:61-4.
5. Frederix I, Caiani EG, Dendale P, Anker S, Bax J, Böhm A, et al. ESC E-cardiology Working Group Position Paper. Overcoming challenges in digital health implementation in cardiovascular medicine. *Eur J Prev Cardiol.* 2019;26:1166-77.
6. Nichols M, Townsend N, Scarborough P, Rayner M. Cardiovascular disease in Europe 2014: epidemiological update. *Eur Heart J.* 2014;35:2950-9.
7. Wilkins EW, Wilson L, Wickramasinghe K, Bhatnagar P, Leal J, Luen-go-Fernandez R, et al. European Cardiovascular Disease Statistics 2017. Brussels: European Heart Network; 2017.
8. Jin K, Khonsari S, Gallagher R, Gallagher P, Clark AM, Freedman B, et al. Telehealth interventions for the secondary prevention of coronary heart disease: a systematic review and meta-analysis. *Eur J Cardiovasc Nurs.* 2019;18:260-71.
9. Huang K, Liu W, He D, Huang B, Xiao D, Peng Y, et al. Telehealth interventions versus center-based cardiac rehabilitation of coronary artery disease: a systematic review and meta-analysis. *Eur J Prev Cardiol.* 2015;22:959-71.
10. Polinski J, Barker T, Gaglione N, Sussman A, Brennan TA, Shrank WH. Patients' satisfaction with and preference for telehealth visits. *J Gen Intern Med.* 2016;3:269-75.