

The ups and downs of telemedicine in treating arterial hypertension

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Abstract

Crises are opportunities for change, development and innovation. Faced with extensive local difficulties as insufficient hospital capacity, medical equipment and personnel, normally slow-moving healthcare systems have improvised and innovated in response to the COVID-19 pandemic. Few could have foreseen that arterial hypertension and its treatment would become a hot topic during these difficult times. Although the idea of using information communications technology (ICT) to provide remote health care services has been born for some time with the general purpose to minimize the frequently visits that patients had to do, in the fire of a pandemic we see benefits of this technology that first were unthinkable to most of us.

Keywords: telemedicine, arterial hypertension, medical telecommunications

Introduction

Crises are opportunities for change, development and innovation. Faced with extensive local difficulties as insufficient hospital capacity, medical equipment and personnel, normally slow-moving healthcare systems have improvised and innovated in response to the COVID-19 pandemic.

We could perceive the recent developments as compressing 20 years of healthcare innovation in the last three months - and nowhere has the rate

of development has been as dramatic as the area of telehealth.

Arterial hypertension or high blood pressure is a cumbersome medical condition that affects an estimated 1.13 billion people worldwide. Hypertension can increase the risk of heart, brain, kidney and other diseases, and it represents a major cause of premature death worldwide, with upwards of 1 in 4 men and 1 in 5 women having the condition. The burden of hypertension is felt disproportionately in low- and middle-income countries, where two thirds of cases are found, largely due to increased risk factors in those populations in recent decades [1].

Few could have foreseen that arterial hypertension and its treatment would become a hot topic during the global COVID-19 pandemic. The aspects that contributed to this have been: first, the observation that high blood pressure is one of the most common comorbidities associated with severe cases

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of COVID-19 in patients who have been admitted to hospital and their risk of death;[2] and second, that like the severe acute respiratory syndrome coronavirus (SARS-CoV), SARS-CoV-2 infects cells via specific binding to angiotensin-converting enzyme 2 (ACE2), which is ubiquitously expressed in the lung and other tissues.[3]

The current difficulty facing health care systems worldwide has been on how to sustain the capacity to provide service not only for those afflicted with COVID-19 but also for trauma patients and those suffering from other acute and chronic diseases while in the same time ensuring protection for the physicians, nurses, and other allied health personnel. This constant need to provide the best care to patients and reduce the burden for both physicians and patients of a face to face consultation when the situation does not necessarily require it, all combined with the rapidly evolving ICT domain, have led to the explosion in the use of telemedicine solutions. During this Pandemic times modern ICT technologies such as the internet, mobile phones, wearables and computers have changed dramatically the way we live, communicate and even manage our health.

By definition, telemedicine represents the delivery of health care services, where distance is a critical factor, by all healthcare professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for the continuing education of health care providers, all in the interests of advancing the health of individuals and their communities [4].

The advantages of telemedicine in hypertension management

Telemedicine has been long described to have a great potential for reducing the variability of diagnoses as well as improving clinical management and delivery of health care services worldwide by enhancing access, quality, efficiency, and cost-effectiveness [5, 6]. In particular, telemedicine is of help in communities traditionally underserved – those in remote or rural areas with few health services and staff – because it overcomes distance and time barriers between healthcare providers and patients [5]. Further, evidence points to important socioeconomic benefits to patients, families, health practitioners and the health system, including enhanced patient-provider communication and educational opportunities [7].

The most common use of telemedicine in treating hypertension is through home-based blood pres-

sure telemonitoring (BPT). BPT allows remote data transmission of blood pressure and additional information on patients' health status from their home or from a community setting to the physician's office or the hospital, with a self-kept log, or remotely via telephone or e-Health-related technology [8,9].

Telemonitoring and smartphone applications can offer additional advantages, such as an aid to memory to make BP measurements, and as a convenient way to store and review BP data in a digital diary and transmit them. The benefits of home BP monitoring are optimized when measurements are telemonitored by a physician, the usage of apps as cuff-independent means of measuring BP not being recommended [10,11].

Through process automation and protocolization, BP telemonitoring can ensure that home BP monitoring is performed in a guideline-concordant manner, ensuring the proper frequency and timing of BP measurements [12]. Telemonitoring theoretically could eliminate the need for an in-person clinic visit, thereby increasing health care delivery efficiency, minimizing costs, and making the use of provider and patient time more efficient [12].

A meta-analysis of 23 randomized controlled trials (RCTs; 7037 patients) reported that home BP telemonitoring reduced BP by 5/3 mm Hg compared with usual care ($P < 0.0001$ for both systolic and diastolic BP) [14]. This is a clinically important reduction in BP, as a 5-mm Hg reduction can decrease the risk of total cardiovascular disease by 17%, stroke by 18%, and myocardial infarction by 15% [15,16].

Another qualitative study on the usability and acceptability of a home blood pressure telemonitoring concluded that overall, the home BP telemonitoring device had very good usability and acceptability among community-dwelling senior citizens with hypertension. This was illustrated by all participants indicating willingness to recommend this device to a friend and 6 of 7 participants stating they would use this device in the future. Additionally, all participants found the device to be simple and straightforward to use. To enhance its long-term use, a few improvements were noted that may mitigate some of the relatively minor challenges encountered by the target population [17].

The drawbacks of telemedicine in hypertension management

In terms of convenience and productiveness, telemedicine is an important upgrade of an existing medical system or a way of introducing a medical system to a less-developed community. The first and foremost difficulty of this systems is that they

are relatively expensive. Although of great use, in an under-equipped hospital with lacking funds a glamorous telecommunication system will not be imperative. [18]

On the other hand, in a rural community a telemedicine system will be a step forward in establishing a doctor-patient relationship, but in a developed medical system it might be interpreted as a breakdown in the relationship between health professionals and patients. In terms of safety, we can easily assure that telemedicine is a conventional alternative for a large number of clinical conditions with at least the same if not higher treatment results. [18,19]

Leaving aside the charismatic technology, we have to focus on how the patients and specialists can establish an adequate communication with the technological options available to them. In order to make the most of the telemedicine research results, we have to ensure the use of the most appropriate technology in the most effective way. [19]

As any technological upgrade, the telemedicine will not be at please for every patient with possible complications related to the incorrect measurements by the patients, despite the accuracy of the information, but it might be the only chance some patients have.

Beyond the pandemic, governments, insurers and healthcare providers need to work together to ensure that the innovation sparked by this crisis endures and accelerates. We need to take steps to ensure that the drawbacks and risks of telehealth can be mitigated. For example, we need to create government regulations to protect patient data privacy and ensure IT network security.

Clinical protocols and workflows should be revisited to ensure that remote care is used only for suitable conditions, and that the doctor-patient relationship is not compromised.

Proper training needs to be provided for clinical staff as they change their way of working.

Very importantly, we need to ensure that our medical insurance systems offer the right incentives to use telehealth. Let us not squander the opportunity offered by this pandemic to do things better.[20]

Conclusion

The blood pressure telemonitoring is the chance of the medical field to encourage and promote the patient's self-management as a complementary treatment technique to the doctor's intervention which hopefully will deliver a more efficient prevention program of the cardiovascular consequences of hypertension.

Small studies are showing promising results, but in order to reliably apply these applications in the life of real-patients we are in strong need of long-term and well-designed clinical trials.

During this pandemic, the use of telemonitoring solutions can slow transmission of the disease by keeping at-risk people out of waiting rooms and reducing their contact with healthcare facilities. It also enables patients who are not suffering from COVID-19 to continue to receive care. This is particularly important for elderly people, who are at the greatest risk during this pandemic. By improving staff productivity, it stretches the capacity of hospital staff so that more people can be treated. Telehealth protects clinicians by reducing physical contact with infected patients. Suspected cases and milder COVID-19 cases that do not need hospitalization can be remotely monitored, freeing up beds for serious cases.

Conflict of Interest

The authors confirm that there are no conflicts of interest.

References

1. World Health Organization. Hypertension. 13 September 2019. <https://www.who.int/news-room/fact-sheets/detail/hypertension>
2. Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China [published correction appears in Lancet. 2020 Jan 30:]. Lancet. 2020;395(10223):497-506. doi:10.1016/S0140-6736(20)30183-5
3. Yun Chen, Yao Guo, Yihang Pan, Zhizhuang Joe Zhao, Structure analysis of the receptor binding of 2019-nCoV, Biochemical and Biophysical Research Communications, Volume 525, Issue 1, 2020, Pages 135-140, ISSN 0006-291X, <https://doi.org/10.1016/j.bbrc.2020.02.071>.
4. Craig J, Patterson v. Introduction to the practice of telemedicine., A health telematics policy in support of WHO's Health-For-All strategy for global health development: report of the WHO group consultation on health telematics, 11-16 December, Geneva, 1997. Geneva, World Health Organization, 1998.
5. Einthoven W. Le télécardiogramme [The telecardiogram]. Journal of Telemedicine and Telecare, 2005, 11(1):3
6. Wootton R. Telemedicine support for the developing world, Journal of Telemedicine and Telecare, 2005, 11(8):384-390.

7. Al Shorbaji N. e-Health in the Eastern Mediterranean region: A decade of challenges and achievements, *Journal of Telemedicine and Telecare*, 2003, 9(6):311-320.
8. Gianfranco Parati MD, PhD Eamon Dolan MD, MRCPI, PhD Richard J. McManus PhD, FRCGP, FRCP Stefano Omboni MD, Home blood pressure telemonitoring in the 21st century, *The Journal of Clinical Hypertension*, 2018, 10.1111
9. Patel B, Turban S, Anderson C, Charleston J, Miller ER, Appel LJ. A comparison of web sites used to manage and present home blood pressure readings. *Journal of clinical hypertension (Greenwich, Conn)* 2010;12(6):389-395
10. Leung AA, Daskalopoulou SS, Dasgupta K, McBrien K, Butalia S, Zarnke KB, Hypertension Canada. Hypertension Canada's 2017 Guidelines for Diagnosis, Risk Assessment, Prevention, and Treatment of Hypertension in Adults. *Can J Cardiol* 2017 May;33(5):557-576
11. Omboni S, Ferrari R. The role of telemedicine in hypertension management: focus on blood pressure telemonitoring. *Curr Hypertens Rep* 2015 Apr;17(4):535
12. Wood PW, Boulanger P, Padwal RS. Home Blood Pressure Telemonitoring: Rationale for Use, Required Elements, and Barriers to Implementation in Canada. *Can J Cardiol* 2017 Dec;33(5):619-625
13. 2018 ESC/ESH Guidelines for the management of arterial hypertension: The Task Force for the management of arterial hypertension of the European Society of Cardiology (ESC) and the European Society of Hypertension (ESH)
14. Omboni S, Gazzola T, Carabelli G, Parati G. Clinical usefulness and cost effectiveness of home blood pressure telemonitoring: meta-analysis of randomized controlled studies. *J Hypertens* 2013 Mar;31(3):455-67; discussion 467
15. Ninomiya T, Perkovic V, Turnbull F, Neal B, Barzi F, et al. Blood pressure lowering and major cardiovascular events in people with and without chronic kidney disease: meta-analysis of randomised controlled trials. *BMJ* 2013 Oct 03;347:f5680
16. Rabi DM, Padwal R, Tobe SW, Gilbert RE, Leiter LA, Quinn RR, Canadian Hypertensive Education Program, Canadian Diabetes Association. Risks and benefits of intensive blood pressure lowering in patients with type 2 diabetes. *CMAJ* 2013 Aug 06;185(11):963-967
17. Lauren Albrecht et. Al, Usability and Acceptability of a Home Blood Pressure Telemonitoring Device Among Community-Dwelling Senior Citizens With Hypertension: Qualitative Study, 2018, *JMIR Aging*
18. On the definition and evaluation of telemedicine. Bashshur, Rashid L. 1, s.l. : *Telemedicine Journal* , 2009, Vol. 1
19. Evaluating telemedicine systems and services. Taylor, Paul. 4, London : *Journal of telemedicine and telecare*, 2005, Vol. 11, pp. 167-177.
20. Telehealth could be a game-changer in the fight against COVID-19. Here's why. 01 May 2020. Pang Sze-Yunn, World Economic Forum <https://www.weforum.org/agenda/2020/05/telehealth-could-be-a-game-changer-in-the-fight-against-covid-19-here-s-why/>