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## **1. The worldwide impact of telemedicine during COVID-19: current evidence and recommendations for the future**

Review [Full-Text PDF RIS](#)

**Copy here to cite this article:** Omboni S, Padwal RS, Alessa T, Benczúr B, Green BB, Hubbard I, Kario K, Khan NA, Konradi A, Logan AG, Lu Y, Mars M, McManus RJ, Melville S, Neumann CL, Parati G, Renna NF, Ryvlin P, Saner H, Schutte AE, Wang J. The worldwide impact of telemedicine during COVID-19: current evidence and recommendations for the future. *Conn Health Telemed* 2022;1:7-35. <http://dx.doi.org/10.20517/ch.2021.03>

### **Abstract**

During the COVID-19 pandemic, telemedicine has emerged worldwide as an indispensable resource to improve the surveillance of patients, curb the spread of disease, facilitate timely identification and management of ill people, but, most importantly, guarantee the continuity of care of frail patients with multiple chronic diseases. Although during COVID-19 telemedicine has thrived, and its adoption has moved forward in many countries, important gaps still remain. Major issues to be addressed to enable large scale implementation of telemedicine include: (1) establishing adequate policies to legislate telemedicine, license healthcare operators, protect patients' privacy, and implement reimbursement plans; (2) creating and disseminating practical guidelines for the routine clinical use of telemedicine in different contexts; (3) increasing in the level of integration of telemedicine with traditional healthcare services; (4) improving healthcare professionals' and patients' awareness of and willingness to use telemedicine; and (5) overcoming inequalities among countries and population subgroups due to technological, infrastructural, and economic barriers. If all these requirements are met in the near future, remote management of patients will become an indispensable resource for the healthcare systems worldwide and will ultimately improve the management of patients and the quality of care.

**Keywords:** COVID-19, telemedicine, telehealth, m-health, Africa, America, Asia, Australia, Europe

## **2. How a cloud based platform can make ambulatory blood pressure monitoring more efficient, accessible, and evidence based**

Perspective [Full-Text PDF RIS](#)

**Copy here to cite this article:** Padwal RS, Wood PW, Ringrose JS. How a cloud based platform can make ambulatory blood pressure monitoring more efficient, accessible, and evidence based. *Conn Health Telemed* 2022;1:36-45. <http://dx.doi.org/10.20517/ch.2022.01>

### **Abstract**

Ambulatory blood pressure measurement (ABPM) is the gold-standard method for blood pressure assessment. However, it is markedly underutilized, in part because legacy software provided with ABPM devices is archaic and inefficient. Herein, we illustrate an example of a recently developed cloud-based ABPM platform. Such a platform offers several distinct advantages: (1) the ability to guide users through the testing process; (2) synchronizing inputs of the technician, patient, physician, and administrative assistant so that testing can be successful and efficient; (3) providing guideline-concordant study interpretations that can be e-signed, reducing physician interpretation times; (4) enabling central expert oversight and peripheral deployment of testing, thereby increasing accessibility of quality testing; and (5) facilitating integration into electronic medical records, improving dissemination of results. It is envisioned that increased use of cloud-based ABPM platforms will lead to the

expansion of quality ABPM testing, thus improving the care of patients with known or suspected hypertension.

**Keywords:** Hypertension, diagnosis, ambulatory blood pressure monitoring, digital health, cloud-based software

### **3. State-of-the-art rapid review of the current landscape of digital hypertension**

Review [Full-Text](#) [PDF](#) [RIS](#)

**Copy here to cite this article:** Kario K, Harada N, Okura A. State-of-the-art rapid review of the current landscape of digital hypertension. *Conn Health Telemed* 2022;1:46-58. <http://dx.doi.org/10.20517/ch.2022.02>

#### **Abstract**

“Digital hypertension” is a new information and communication technology (ICT)-based research field of digital healthcare that adds significant value to the management of hypertension by integrating multidimensional and time-series data. It includes the study of pathogenesis and predictive, individualized, and preemptive treatments, and its clinical outcomes can be introduced in telemedicine. The ICT in digital hypertension includes the research and development of blood pressure (BP) monitoring, e.g., wearable, cuff-less BP monitoring, a platform for digital transformation and transmission systems, and artificial intelligence. A recent clinical trial demonstrated the significant BP-lowering effect of digital therapeutics that facilitate lifestyle modification at the individual level via the patient’s smartphone. One of the goals of digital hypertension is personalized anticipation medicine that identifies the timing, place, and behavior that may trigger the onset of a cardiovascular event. This narrative review aims to address and discuss the cutting-edge information on the technology and concept of “digital hypertension”.

**Keywords:** Digital hypertension, digital health, telemonitoring, blood pressure monitoring, wearable device, digital therapeutics, anticipation medicine, rapid review, state-of-the-art review

### **4. Connected Health: first issue @ a glance**

Editorial [Full-Text](#) [PDF](#) [RIS](#)

**Copy here to cite this article:** Omboni S. Connected Health: first issue @ a glance. *Conn Health Telemed* 2022;1:59-61. <http://dx.doi.org/10.20517/ch.2022.05>

### **5. Detection of health deterioration in a COVID-19 patient at home: the potential of ambient sensor systems**

Case Report [Full-Text](#) [PDF](#) [RIS](#)

**Copy here to cite this article:** Saner H, Schütz N, Bulushek P, Du Pasquier G, Morf S, Frech M, Nef T. Detection of health deterioration in a COVID-19 patient at home: the potential of ambient sensor systems. *Conn Health Telemed* 2022;1:62-71. <http://dx.doi.org/10.20517/ch.2022.03>

#### **Abstract**

The COVID-19 pandemic created increased interest in monitoring patients at home to allow timely recognition of health deteriorations. Hospital care is particularly demanding in these patients because of the necessity for isolation to avoid further spread of the disease. Therefore, home care is a preferred treatment setting for these patients. This is, to our knowledge, the first report indicating the potential of an affordable, contactless, and unobtrusive ambient sensor system for the detection of signs of health deterioration in a patient with COVID-19 by a caregiver from a distance. Prospective data acquisition and correlation of the data with clinical events were

obtained from an 81-year-old senior with COVID-19 before and, in particular, over a period of 10 days prior to hospitalization. Clinical signs included weakness, increased respiration rate, sleep disturbances, and confusion. The visualization of a combination of this information on a dedicated dashboard allowed the caregiver to recognize a serious health deterioration that required a lifesaving hospitalization. The potential of such ambient sensor systems to detect signs of serious health deterioration in patients with COVID-19 opens new opportunities for use in asymptomatic or oligosymptomatic patients who live alone and are sent back to their homes for isolation in quarantine after diagnosis.

**Keywords:** Digital biomarkers, ambient sensor systems, home monitoring, telemonitoring, COVID-19

## **6. Digital health technology and hypertension management: a qualitative analysis of patient and specialist provider preferences on data tracking**

Original Article [Full-Text](#) [PDF](#) [RIS](#)

**Copy here to cite this article:** Chow R, Forde B, Sawatzky R, Patiño AG, Tran KC, Bittman J, Khan NA. Digital health technology and hypertension management: a qualitative analysis of patient and specialist provider preferences on data tracking. *Conn Health Telemed* 2022;1:72-84. <http://dx.doi.org/10.20517/ch.2022.07>

### **Abstract**

**Aim:** Digital health for hypertension management holds potential for improving the quality of care but requires long-term patient engagement to track health data. We explored patient and hypertension specialist perceptions of clinical utility for data tracking including standardized patient-reported outcome measures (PROMs), home blood pressure (BP) measurement, and other health metrics.

**Methods:** Participants reviewed general health status, patient satisfaction, and hypertension-specific PROMs. Semi-structured focus groups (n = 15) with nine patients with hypertension and six hypertension specialists were audio-recorded and thematically analyzed.

**Results:** Key themes identified from patients included: (1) comfort and appreciation of home BP monitoring but only during important periods of hypertension care; (2) preference for tracking new symptoms and medication side effects; (3) patients perceived tracking other health measures including general PROMs, diet and exercise as less relevant to their care; and (4) visually represented BP trends evaluating associations with changes in other health parameters were perceived as useful. Key themes identified by hypertension specialists included: (1) concerns about patient digital literacy; (2) utilizing visual representations of long-term BP data trends for patient empowerment; and (3) unclear relevance of tracking medication adverse effects, PROMs, and other non-BP health metrics.

**Conclusion:** Patients and hypertension specialists had similar perspectives for most aspects of data monitoring but differed in preference for a few aspects that were germane to patients, including monitoring medication adverse effects and symptoms. Including views on data tracking from both patients and providers are essential for designing digital tools to optimize hypertension management.

**Keywords:** Hypertension, qualitative, patient-reported outcome measures

## 7. Telemedicine for hypertension management: where we stand, where we are headed

Review [Full-Text](#) [PDF](#) [RIS](#)

**Copy here to cite this article:** Omboni S. Telemedicine for hypertension management: where we stand, where we are headed. *Conn Health Telemed* 2022;1:85-97. <http://dx.doi.org/10.20517/ch.2022.09>

### Abstract

Hypertension is the leading cause of cardiovascular disease worldwide. Telemedicine may support doctors and health care professionals to raise awareness, increase detection, and improve the management of hypertension, by enhancing the connection with their patients. Given the growing popularity of telemedicine, the objective of the present review paper is to present the typical applications of telemedicine in hypertension management and available recommendations for use and summarize the evidence of their clinical efficacy before and during COVID-19 and the future trends and perspectives. Blood pressure telemonitoring (BPT), which enables remote transmission of BP and additional information on a patient's health status from different settings to a healthcare facility, is the most common application of telemedicine for hypertension management. BPT is an integral component of a complex and multifaceted intervention, which includes video consultation, education on lifestyle and risk factors, antihypertensive medication review and management, and multidisciplinary team care. Several randomized controlled studies documented larger BP reduction and enhanced BP control with telemedicine compared to usual care. Telemedicine also helps optimize antihypertensive medications, improve treatment adherence, reduce office visits and resort to laboratory tests, and improve quality of life. At the time of COVID-19, telemedicine has helped to maintain adequate BP control in hypertensive patients under home confinement. Consequently, telemedicine is generally recommended to ensure continuity of care for hypertensive patients with uncontrolled BP, older patients, those at high risk of developing cardiovascular diseases, those with multiple comorbidities, medically underserved people, or patients isolated due to pandemics or national emergencies. Telemedicine applications relying on smart wearables, cuffless BP monitors, multiparametric devices, ambient sensors, and tools integrated with machine learning algorithms are particularly promising for telemedicine's future development and diffusion since they may provide continuous surveillance of patients and remarkable support decision tools for doctors.

**Keywords:** Hypertension, blood pressure, telemedicine, telehealth, telemonitoring, mobile health, machine learning, smart wearables, cuffless blood pressure monitors, ambient sensors

## 8. Clinical data sharing using Generative Adversarial Networks

Editorial [Full-Text](#) [PDF](#) [RIS](#)

**Copy here to cite this article:** Ayyoubzadeh SM, Ayyoubzadeh SM, Esmaeili M. Clinical data sharing using Generative Adversarial Networks. *Conn Health Telemed* 2022;1:98-100. <http://dx.doi.org/10.20517/ch.2022.15>

### Abstract

Obtaining data is challenging for researchers, especially when it comes to medical data. Moreover, using medical data as there are concerns about privacy and confidentiality

issues requires specific considerations. Generative models aim to learn data distribution via various statistical learning approaches. Among generative models, a machine learning-based approach named Generative Adversarial Networks (GANs) has proved their potential in the implicit density estimation of high dimensional data. Therefore, we suggest an approach that each healthcare organization, especially hospitals, could create and share their own GAN model, entitled Hospital-Based GANs (H-GANs), instead of sharing raw data of patients.

**Keywords:** Machine learning, Generative Adversarial Networks, data sharing, anonymous

## **9. Home blood pressure in target range as an additional therapeutic goal in hypertensive patients: a telemonitoring-based analysis**

Original Article [Full-Text](#) [PDF](#) [RIS](#)

**Copy here to cite this article:** Ionov M, Usova E, Egorov M, Zvartau N, Konradi A. Home blood pressure in target range as an additional therapeutic goal in hypertensive patients: a telemonitoring-based analysis. *Conn Health Telemed* 2022;1:101-11. <http://dx.doi.org/10.20517/ch.2022.12>

### **Abstract**

**Aim:** Guidelines recommend treating hypertension (HTN) by keeping office blood pressure (BP) within the therapeutic range (TR). However, little is known about the TR of home BP. Therefore, we aimed to find a reliable proportion of home systolic (S) BP in TR (sBPiTR) using a telehealth platform, which facilitates the access to reliable and structured home BP data.

**Methods:** We used the data of HTN patients who participated in BP telemonitoring and counseling for 3 months. Patients had to manually enter their home BP in electronic diaries. Home SBP readings were averaged by the system itself except the very first or every first day of BP monitoring. We divided sBPiTR (110-130 mmHg) by quartiles. A weighted Cohen's kappa coefficient was used as an estimate of inter-rater reliability between sBPiTR and office/home SBP in TR. We used a binomial logistic regression to test the predictive value of sBPiTR on target office/home SBP achievement.

**Results:** In total, 123 patients were included (median age 54 years; 102 males) with a median office SBP of 140 mmHg. By 3 months, it decreased to 130 mmHg ( $P < 0.001$ ), with 60% of patients with target office BP and 70% in the upper sBPiTR quartiles. There was a slight agreement between office SBP in TR and sBPiTR of  $\geq 50\%$  ( $k = 0.19$ ,  $P < 0.035$ ) and fair agreement when counteracted against home SBP in TR ( $k = 0.32-0.65$ ,  $P < 0.0001$ ). Patients with sBPiTR of  $\geq 50\%$  were more likely to fall within the office and home SBP TR after adjustment for baseline covariates.

**Conclusion:** The threshold of 50% of home SBP measurements within 110-130 mmHg has a slight agreement with office BP control and a fair agreement with home BP control. This variable may serve as a predictor for the achievement of target SBP both in and out of office. Larger studies are needed to confirm these preliminary results.

**Keywords:** Hypertension, telehealth, mobile health, cardiovascular risk, blood pressure, home blood pressure monitoring, kappa coefficient, measurement

## **10. Telemedicine for blood pressure control in low- and middle-income countries: the journey ahead**

Perspective [Full-Text](#) [PDF](#) [RIS](#)

**Copy here to cite this article:** Ware LJ. Telemedicine for blood pressure control in low- and middle-income countries: the journey ahead. *Conn Health Telemed* 2022;1:112-6. <http://dx.doi.org/10.20517/ch.2022.16>

## **Abstract**

In just over a half-century since the initiation of telemedicine, technological developments have created multiple options to shape how patients can access healthcare and interact with healthcare providers to better prevent and manage hypertension. In several high-income countries, patients are connecting to their healthcare providers online to book appointments, request prescriptions, see test results and engage in proactive health management. Mounting evidence suggests that telemedicine and mobile health (mHealth) services can yield greater reductions in blood pressure when compared with usual care while also offering greater reach, efficiency, and potential cost-saving. A deeper examination of implementing such systems at scale in high-income countries shows varying approaches and levels of success. While research investigating the benefits of technology for blood pressure control in low- and middle-income countries is growing, in regions such as sub-Saharan Africa, economic and digital divides present major challenges to scaling such technology. Substantial national investments in infrastructure and skills development are needed alongside consultation with multiple stakeholders to ensure that technological advancements do not further drive health disparities in the region.

**Keywords:** Telemedicine, sub-Saharan Africa, hypertension, mHealth, access to healthcare, healthcare disparities, electronic health records, electronic medical records