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1. Use of mHealth for management of hypertension in low and middle-income countries: opportunities and challenges

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

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Abstract

Despite being the leading cause of global mortality, the hypertension control rate is astonishingly low, particularly in low- and middle-income countries. There is evidence that the mHealth approach is a potential platform for delivering interventions for hypertension management. Our recent study from Nepal also provided strong evidence for reducing blood pressure, improving control rate, and medication adherence. The objective of this paper is to document the real-world experience of designing and implementing a mHealth project in Nepal and relates them with the evidence from other similar Low- and Middle-Income Country (LMIC) settings. We learned that mHealth provides a unique opportunity to bridge the gap between providers and patients, send health education and reminder messages, secure patients' privacy, and make data management easier. We also encountered technological and financial barriers, unclear mHealth policy and guidelines, and low literacy levels, including digital literacy. As many of them are addressable, integrating mHealth provides a promising approach to hypertension management.

Keywords: High blood pressure, mobile health, digital health, developing countries, barriers

2. Hypertension management in sub-Saharan Africa: an overview of challenges and opportunities for telemedicine

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

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Abstract

Hypertension is the leading contributor to cardiovascular disease (CVD)-related deaths globally, with Africa being one of the World Health Organization regions with the highest prevalence of elevated blood pressure (BP). In sub-Saharan Africa (SSA), awareness, treatment, and control levels of hypertension remain low in both men and women and in different settings, including rural and urban areas. Important barriers to the management of hypertension in SSA are within health systems, usually overburdened by communicable and non-communicable diseases, acute medical conditions, and child and maternal healthcare. Health system-related challenges include the availability and cost of essential medicines and healthcare workforce constraints. At the patient level, individual barriers such as sociodemographic, economic, and psychosocial factors contribute significantly to the poor control of hypertension. Telemedicine presents a promising approach to improve the delivery of optimal care for individuals living with hypertension by serving as a connection between healthcare providers and patients. This may enhance access to isolated people living with hypertension, such as in rural areas. However, there is a concern that telemedicine may exacerbate some of the barriers to the management of hypertension in disadvantaged groups, such as those with limited access to digital technology, low education and

literacy levels, and the ageing population. Therefore, the objective of this review is to summarize the current state of telemedicine use in the management of hypertension in SSA and discuss the challenges and opportunities to provide cost-effective, equitable, and sustainable access to digital health technology for people living with hypertension in SSA.

Keywords: Hypertension management, sub-Saharan Africa, telemedicine, health equity, digital health

3. Telemonitoring in hypertension management for patients with chronic kidney disease: a narrative review

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Abstract

Hypertension is a major cause of cardiovascular disease worldwide and a major cause of morbidity and mortality in patients with chronic kidney disease (CKD). The Systolic Blood pressure Intervention Trial (SPRINT) demonstrated that blood pressure (BP) measurement techniques may have an impact on the achievement of outcomes. Home BP monitoring (HBPM) has several advantages over office BP recordings, including avoidance of white-coat reaction, ability to diagnose white-coat and masked hypertension, detection of BP variability, and better ability to predict cardiovascular morbidity and mortality, all of which commonly occur in CKD. The addition of telemonitoring and management support to HBPM allows remote monitoring, especially when close contact is difficult (e.g., patients in remote/rural areas, pandemic, natural disaster, or patients treated with home dialysis). Although there are few studies that have assessed the efficacy of home BP telemonitoring (HBPT) in patients with CKD, these studies suggest the benefits of HBPT for BP control and even limited evidence that it may improve kidney function. This review, using limited available evidence, assesses the roles of HBPT in patients with CKD, barriers to HBPT implementation in the care of patients with CKD, and discusses newer technologies that can be leveraged in the management of hypertension in patients with CKD.

Keywords: Blood pressure measurement, blood pressure variability, chronic kidney disease, home blood pressure, out-of-office blood pressure, telemonitoring

4. Embracing the future of healthcare: launching the Journal of Connected Health And Telemedicine

Editorial [Full-Text PDF RIS](#)

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5. The current state of blood pressure measurement and emerging technologies

Review [Full-Text PDF RIS](#)

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Abstract

Office blood pressure measurement has been the primary means of diagnosing and treating hypertension for almost a century. Increasingly, guidelines recommend out-of-office measurements (ambulatory or home blood pressure measurement) to confirm the diagnosis of hypertension and to follow treated patients. Ambulatory blood pressure measurement includes nocturnal measurement and provides a 24-hour blood pressure profile, enabling calculation of overall blood pressure, daytime mean, and nocturnal mean. Home blood pressure monitoring is a method of blood pressure measurement that is convenient and accessible. Blood pressure telemonitoring is a complementary and emerging technology that enhances the effectiveness of out-of-office blood pressure measurement and has the potential to improve the health of end users through engagement, efficiency, and enhanced communication with the care team. Blood pressure measurements can be obtained remotely, effectively transmitted to their health care team via telemonitoring for interpretation, and then a care plan can be developed and implemented. However, care must be taken to ensure that these emerging technologies record and transmit accurate blood pressure information in a secure and reliable manner.

Keywords: Blood pressure measurement, blood pressure telemonitoring, automated blood pressure measurement

6. A qualitative study for co-designing the future of technology to support physical activity for adolescents living with type 1 diabetes

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

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Abstract

Aim: The aims of this study were to (i) understand what adolescents (and their parents) identify as positive and negative experiences with technology for engaging in physical activity (PA) when living with type 1 diabetes (T1D) and (ii) identify possible future design considerations for supporting or enabling technologies for this population.

Methods: Nine online collaborative workshops (n = 25 people) were held over a month with participants who were either adolescents attending with (n = 22) or without (n = 3, aged 16 and over) parents. Each workshop involved (1) a training activity, (2) a design task involving describing a good day vs. a bad day, and (3) a design task asking people to consider future design changes for technology to support them in engaging with physical activity.

Results: The following key themes emerged from the first design task: (1) Wearable factors; (2) Social acceptance & identity; (3) Negative emotions; (4) Glycaemic stability offers positive emotions and PA Enjoyment; and (5) Presence, preparation & prevention. The second design task identified the following additional key themes: (6) Improve attachment experiences; (7) Connected devices reduce user burden; (8) Improve accuracy; (9) Personalisation of devices; (10) Funding and policy changes – health equity.

Conclusion: Technology can reduce the burden and improve PA support, but there are still gaps in how these technologies can be better designed to consider the psychosocial and emotional factors of both adolescents and their parents as co-users.

Keywords: Type 1 diabetes, technology, adolescent, co-design, digital health, user-centred design

7. The use of restricted activity to identify global decline in multimorbidity: current evidence and the potential of a connected health approach

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

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Abstract

There is a rising problem of multiple long-term conditions (“multimorbidity”) as the global population ages. Old age is the biggest risk factor for having one or more chronic conditions. Unfortunately, current care processes can be fragmented, with most focusing on individual diseases. This can lead to unintended consequences for patients, particularly if they are admitted onto an inappropriate care pathway, along with subsequent economic downsides. When people with multiple long-term conditions deteriorate, detection of illness may be delayed due to a range of non-specific symptoms being displayed. At present, there is limited research on detecting deterioration within community settings, thereby forming the basis of earlier interventions. A general measure, such as how active an individual is, might allow initial identification of decline and trigger a more targeted approach to assess the underlying reason for deterioration. Restricted activity seems to manifest earlier than the routinely used single condition clinical markers, and has been identified both in the last year of life and during periods of illness. Changes in activity could facilitate the identification of illness, leveraging technology to determine any decline. However, there is still no universally agreed definition of what constitutes a change in activity and, therefore, no accepted method of measuring it. This paper reviews the potential for a connected health approach to monitoring older adults with multimorbidity, using restricted activity as a general measure of health decline.

Keywords: Long Term Multiple Conditions, Multimorbidity, digital health, disease monitoring, restricted activity

8. Camera-based remote photoplethysmography for blood pressure measurement: current evidence, clinical perspectives, and future applications

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

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Abstract

Telehealth has seen rapid adoption in the past three years as a direct result of the COVID-19 pandemic. Conventional methods for the measurement of vital signs are neither optimized for remote care nor highly scalable. Blood pressure is a critical vital parameter that currently cannot be measured remotely. Cameras are versatile and capable sensors that can be repurposed to measure vital signs. In this article, we review the use of cameras for remote photoplethysmography and assessment of blood pressure. We discuss the principles behind this technology and the current evidence for blood pressure measurement. We also explore future applications and potential challenges to provide a roadmap for researchers, clinicians, and regulators considering this new technology.

Keywords: Camera, remote, video, contactless, vital signs, photoplethysmography, cuffless, blood pressure, telemedicine, continuous monitoring

9. Impact of different financial incentive structures on a web-based health survey: do timing and amount matter?

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

Copy here to cite this article: Escudero JN, Tiro JA, Buist DSM, Gao H, Beatty T, Lin J, Miglioretti DL, Winer RL. Impact of different financial incentive structures on a web-based health survey: do timing and amount matter?. *Conn Health Telemed* 2023;2:200006. <http://dx.doi.org/10.20517/chatmed.2023.002>

Abstract

Aim: Financial incentives improve response to electronic health surveys, yet little is known about how unconditional incentives (guaranteed regardless of survey completion), conditional incentives, and various combinations of incentives influence response rates. We compared electronic health survey completion with two different financial incentive structures.

Methods: We invited women aged 30-64 years enrolled in a U.S. healthcare system and overdue for Pap screening to complete a web-based survey after receiving a mailed human papillomavirus (HPV) self-sampling kit in a pragmatic trial. HPV kit returners (n = 272) and non-returners (n = 1,083) were allocated to one of two different incentive structures: (1) Unconditional: \$5 pre-incentive only (n = 653); (2) Combined: 2pre – incentive plus 10 post-incentive conditional on completion (n = 702). Chi-square tests evaluated whether survey completion differed by incentive structure within kit return groups or was modified by kit return status. For each incentive-by-kit status group, the cost-per-survey response was calculated as: $([\text{number invited} * \text{pre-incentive amount}] + [\text{number responses} * \text{post-incentive amount}]) / \text{number responses}$.

Results: Overall, survey response was higher in kit returners vs. kit non-returners (42.6% vs. 11.0%, $P < 0.01$), and survey response was higher in the combined (20.1%) vs. unconditional (14.4%) incentive group ($P = 0.01$). Kit return status did not modify the association between incentive type and survey response ($P = 0.52$). Among respondents, time to survey completion did not differ by incentive type among either kit returners or non-returners. Among returners, the cost-per-survey response was similar between groups (13.57 unconditional; 14.15 combined); among non-returners, the cost was greater in the unconditional (57.78) versus the combined (25.22) group.

Conclusion: A combined incentive can be cost-effective for increasing survey response in health services research, particularly in hard-to-reach populations.

Keywords: Conditional, costing, incentive, survey, unconditional

10. Towards wearable sensing-based precise and rapid responding system for the early detection of future pandemic

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

Copy here to cite this article: Xiang T, Liu Z, Ji N, Lu L, Clifton DA, Li X, Deen MJ, Lovell NH, Veetil JC, Zhu H, Yan B, Mok V, Zhang YT. Towards wearable sensing-based precise and rapid responding system for the early detection of future pandemic. *Conn Health Telemed* 2023;2:200007. <http://dx.doi.org/10.20517/chatmed.2023.02>

Abstract

During the past three years, tremendous efforts have been made to tackle the Coronavirus Disease 2019 (COVID-19) crisis, including centralized quarantine, compulsory testing, and sweeping lockdowns. The measures have taken effect, but have caused a huge burden on healthcare systems and significant disruption to global

economies on an unprecedented scale. Recently, some countries and regions have observed signs of the pandemic resurgence. To better handle the resurgence in the post-COVID era and future pandemics, an immediate revolution of the precise and rapid responding system capable of early detection is needed. Based on a comprehensive review, this article summarizes the enabling wearable devices in physiological monitoring and biomolecular diagnosis, highlights their potential contributions to the detection and management of COVID-19, as well as its long-term effects, and suggests a wearable sensing-based system to avoid future pandemics. Wearable devices, in conjunction with mobile health (mHealth) technologies, provide a novel way to track and monitor diseases through continuous physiological, physical, and biomolecular sensing. Augmented by artificial intelligence (AI), especially the emerging Generative Pre-trained Transformer (GPT) algorithms, patients could potentially be identified before they become symptomatic. By combining contact tracing and effective quarantine, it is possible to arrest the spread of the disease and control its emergence at an early stage. Furthermore, with minor refinements, the proposed response system holds the potential for extended use beyond COVID-19, particularly in addressing cardiovascular diseases (CVDs) during both outbreaks and non-pandemic scenarios. By implementing this groundbreaking approach, there exist valuable prospects to transform the current healthcare paradigm and drive significant advancements in disease prevention, detection, and management.

Keywords: COVID-19, wearables, early detection, long COVID, responding system

11. Some perspectives of continuous arterial blood pressure measurements: from kymograph to tonoarteriographic imaging

Perspective [Full-Text PDF RIS](#)

Copy here to cite this article: Liu ZJ, Xiang T, Ji N, Zhang YT. Some perspectives of continuous arterial blood pressure measurements: from kymograph to tonoarteriographic imaging. *Conn Health Telemed* 2023;2:200008. <http://dx.doi.org/10.20517/chatmed.2023.03>

Abstract

The measurement and monitoring of continuous arterial blood pressure (BP) have undergone significant evolution over the past 170 years, transitioning from ancient invasive approaches, like kymograph, to modern non-invasive and unobtrusive technologies such as tonoarteriography (TAG). This progressive shift has revolutionized the way we track BP, providing safer, more accurate, and convenient methods for monitoring BP. This paper aims to provide some historical perspectives on the development of continuous BP technology, highlight key milestones that have shaped the field, discuss the state-of-the-art two-dimensional TAG imaging, and address challenges for future unobtrusive BP measurements. In addition to presenting a concise review of the progression of continuous BP measurement technologies, this article also emphasizes the importance of adopting more precise, convenient and affordable approaches for personalized BP monitoring at home and patient care optimizations at hospitals, thereby empowering healthcare professionals to enhance pervasive hypertension management anywhere.

Keywords: Blood pressure, unobtrusive BP, continuous BP, cuffless BP, two-dimensional tonography imaging, hypertension

12. Advancing cardiovascular disease prediction: portable or wearable devices for automatic and rapid blood sample collection for biomarker detection with simultaneous physiological marker measurement

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

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13. Review of electrooculography-based human-computer interaction: recent technologies, challenges and future trends

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

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Abstract

Electrooculography-based Human-Computer Interaction (EOG-HCI) is an emerging field. Research in this domain aims to capture eye movement patterns by measuring the corneal-retinal potential difference. This enables translating eye movements into commands, facilitating human-computer interaction through eye movements. This paper reviews articles published from 2002 to 2022 in the EOG-HCI domain, aiming to provide a comprehensive analysis of the current developments and challenges in this field. It includes a detailed and systematic analysis of EOG signal electrode arrangement, hardware design for EOG signal acquisition, commonly used features, and algorithms. Representative studies in each section are presented to help readers quickly grasp the common technologies in this field. Furthermore, the paper emphasizes the analysis of interaction design within the EOG-HCI domain, categorizing different interaction task types and modalities to provide insights into prevalent interaction research. The focus of current research in the field is revealed by examining commonly used evaluation metrics. Lastly, a user-centered EOG-HCI research model is proposed to visually present the current research status in the EOG-HCI field from the perspective of users. Additionally, we highlight the challenges and opportunities in this field.

Keywords: Electrooculography, user interface, human-computer interaction, interaction design

14. A protocol for digital cardiovascular prevention feasibility study using hybrid home blood pressure telemonitoring system

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

Copy here to cite this article: Kario K, Nishizawa M, Yasui N, Fujiwara T, Kunigita T, Harada N, Hoshide S. A protocol for digital cardiovascular prevention feasibility study using hybrid home blood pressure telemonitoring system. *Conn Health Telemed* 2023;2:2000011. <http://dx.doi.org/10.20517/chatmed.2023.08>

Abstract

Aim: The DICAP feasibility study aims to determine chronological blood pressure (BP) control status and BP variability up to the end of life in different life settings in the community and their clinical implications.

Methods: A simple, easy-to-use automated hybrid BP telemonitoring system combined cellular and Bluetooth BP monitors, the DICAP (DIgital Cardiovascular Prevention) system, was devised to obtain all the different BP values measured in a time series in different settings in 500 community-dwelling individuals in their homes and local elderly care facilities.

Expected results and Perspectives: This study will confirm the feasibility of collecting BP variability over time until the end of life for the management of hypertension in all community-dwelling patients, including those unfamiliar with digital technology and those in diverse residential settings, such as elderly care facilities. This feasibility study has the potential to serve as a basis for future community and disaster medicine initiatives worldwide.

Keywords: Community, home blood pressure, telemonitoring system, DICAP, elderly, hypertension

15. A scoping review of digital health interventions for cardiovascular diseases in the WHO South-East Asia region

Review [Full-Text PDF RIS](#)

Copy here to cite this article: Singh V, Johnson KR, Jacob AG, John O. A scoping review of digital health interventions for cardiovascular diseases in the WHO South-East Asia region. *Conn Health Telemed* 2023;2:2000012. <http://dx.doi.org/10.20517/chatmed.2023.07>

Abstract

Digital health interventions for managing Non-Communicable Diseases, specifically cardiovascular diseases, are gaining momentum in Low-Middle-Income countries (LMICs), notably in the South-East Asia region. The effective implementation of these interventions hinges on their ability to effectively cater to user needs within the healthcare system. Our objective is to examine the usage of digital health approaches or modalities. A scoping review was conducted using PUBMED and SCOPUS databases, and the findings were synthesized narratively using the WHO's Digital Health Intervention (DHI) framework. The initial search yielded 1,505 articles, of which 51 met our inclusion criteria. In terms of the target users for digital health applications, providers remain the major focus, while other stakeholders such as data managers and health system managers remain neglected. Even within "provider-focused" applications, telemedicine dominates in the functionality aspect. Further, few applications addressed client issues such as client-to-client communication, personal health tracking, and the client's financial transactions. Few applications address the

needs of data managers and health system managers. Moving forward, member countries in South-East Asia would benefit from digital health applications that specifically target data services and health system managers. For clients, functionalities such as personal health tracking, active data capture, citizen-based reporting, on-demand information services, and peer groups are required. For healthcare providers, features such as access to longitudinal client health records, decision support systems, referral coordination, prescription, and medication management, as well as laboratory and diagnostic imaging management, should be seamlessly integrated into existing digital health applications.

Keywords: Digital health interventions, telehealth, cardiovascular diseases, telemedicine, South-East Asia

16. Interventions of eHealth technologies integrated with non-physician health workers for improving management of hypertension: Systematic review and meta-analysis

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Abstract

Hypertension is a major public health problem, accounting for 7.5 million deaths and 57 million disability-adjusted life years annually worldwide. The majority of hypertension-related deaths occur in low- and middle-income countries (LMICs). Despite the escalating prevalence of hypertension in many LMICs, only one-third of men and less than half of women with hypertension were aware of their hypertension status in Sub-Saharan Africa, and South Asia. The rapid proliferation of eHealth technologies presents an opportunity to improve the detection and management of hypertension. Many LMICs face a critical shortage of physicians, and their services often come at a considerable cost to the health system. Non-physician health workers could be a cost-effective alternative to improve the detection and management of hypertension, particularly in LMICs. In this systematic review, we aim to synthesize and evaluate the effectiveness of interventions that integrated eHealth technologies with non-physician health workers to reduce blood pressure. A diverse range of eHealth technologies, such as mobile-based applications, telemonitoring, short text messaging and electronic decision support systems, are being used by non-physician health workers for the management of hypertension. We found that eHealth technologies integrated with non-physician health workers reduced overall mean systolic blood pressure by -4.09 mmHg (95%CI: -5.87 to -2.32) compared to usual care. Similarly, such an integrated approach also reduced diastolic blood pressure by -1.25 mmHg (-2.31 to -0.81) in the intervention group than usual care. Therefore, leveraging the use of cost-effective eHealth technologies to support task-sharing with non-physicians presents an effective strategy for enhancing blood pressure management, applicable to both high- and low-income countries.

Keywords: Hypertension, blood pressure, task-sharing, eHealth intervention, non-physician health workers intervention

17. Acknowledgment to reviewers of Connected Health And Telemedicine in 2023

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

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18. Year-end reflections of CHATmed - 2023

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

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