

ROLE OF MOBILE HEALTH IN THE PREVENTION AND CONTROL OF NON-COMMUNICABLE DISEASES

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Introduction

Mobile health (mHealth) plays a significant role in non-communicable disease (NCD) control by enabling patients to monitor symptoms, track lifestyle behaviours, receive health education, access reminders for medication adherence, and connect with healthcare providers, ultimately promoting self-management and early detection of complications, particularly in areas with limited access to healthcare facilities; this can be achieved through mobile apps, text messages, and wearable devices that facilitate real-time data collection and personalized interventions.¹⁻³

mHealth includes smartphone-based reusable glucometers, mobile-phone-based systems, combined microfluid devices; non-invasive blood glucose monitors, wearable and mobile devices; add-ons and smartphone applications, and iPod applications.^{3,4} They are developed for diagnosis, monitoring, screening, notifications, reminders and management of lifestyle behaviours and tracking of behavioural change. They have been deployed into the management of cardiovascular diseases, chronic respiratory disease, retinopathy, type 2 diabetes, musculoskeletal disorders, falls, cancer screening and smoking cessation.⁴ Of equal importance is using social media platforms such as WhatsApp, Snap Chat, Instagram, X (formerly Twitter) and YouTube to improve access to reliable health information and self-care management practices.³

Key functions of mHealth in NCD control:

Patient education and awareness:

Delivering reliable information about NCD risk factors, healthy lifestyle choices, self-efficacy and disease management strategies through mobile apps and text messages.^{2,3,5} mHealth can offer personalized health education and awareness campaigns, targeting specific NCDs and risk factors. It can empower patients to take an active role in their health, improving health literacy and self-management skills.³ mHealth can facilitate

community-based interventions, promoting social support and community engagement in NCD control.

Addressing Health System Challenges:

Opportunity to deliver in-service training on NCDs in resource-constrained and remote settings on NCDs to healthcare workers; without pulling them out of their service stations. This offers the healthcare workers the chance to improve NCD knowledge, attitude and skills without abandoning their service stations; reduce logistical needs for

such training and retain healthcare workers to give much-needed care to populations.^{2,5,6} mHealth tools also ensure that healthcare providers have access to resources, and decision-support tools for the overall healthcare workforce development. It also contributes to health system strengthening, improving data collection, analysis, and use for decision-making.

Self-monitoring:

Allowing patients to track their behaviours and vital signs like blood pressure, blood sugar levels, weight, and physical activity using mobile apps and wearable devices, enables proactive management. Continuous monitoring provides an opportunity to track lifestyle changes, and clinical and biochemical measurements might help healthcare providers understand the trends and offer prompt and/or individualized care to patients with NCDs to improve patient's experience and outcomes.^{2,3} mHealth tracking of individuals' behaviours can also provide personalized feedback, encouraging positive behavioural changes.

Medication adherence reminders:

Sending timely notifications to patients to take medications as prescribed has been shown to increase medication adherence. This is because forgetfulness has been identified as a major reason for poor medication adherence.^{3,7} A recent systematic review shows that medication-taking reminders show the highest improvement among medication adherence interventions.⁷ mHealth can therefore send medication adherence reminders, improving treatment adherence and reducing the risk of complications.

Telehealth consultations:

mHealth enables teleconsultations and remote consultations, increasing access to healthcare services, especially for rural or hard-to-reach populations. This opportunity for remote consultations with healthcare providers provides an opportunity for diagnosis, treatment adjustments, and follow-up care of vulnerable populations.^{2,3,8}

Enhancing Disease Surveillance and Monitoring: mHealth enables real-time data collection, allowing for timely surveillance and monitoring of NCDs. mHealth can also facilitate remote patient monitoring, enabling healthcare providers to track patients' health status and adjust treatment plans accordingly. It also enhances early detection and screening by reminding patients to undergo regular NCD screenings and facilitating access to screening services.^{2,6,8}

Challenges, considerations and recommendations:

Digital literacy

Ensuring accessibility for individuals with low digital literacy levels is essential to the success of the use of mHealth services and tools. Continuous self-care management education and sustained demonstration by healthcare providers on how to use and regularly calibrate the tools are of paramount importance to achieve excellent and sustained positive outcomes. It will also help patients and their care supporters to develop self-efficacy, autonomy and adequate involvement in the prevention and management of disease.

Data privacy and security

Protecting sensitive patient health information and their unauthorized accessibility online via the internet and mobile tools is of increasing concern globally. Healthcare data breaches have become prevalent (especially hacking, theft/loss and unauthorized internal disclosures) and come with a huge cost. This has been forecasted to continue into the future.^{9,10} Therefore, all stakeholders should ensure no loose ends in data protection activities and prompt action whenever there is a failure of healthcare data protection. Pool and colleagues recommended some interventions to follow in such scenarios.⁹

Integration with healthcare systems

Seamless integration of mHealth data into electronic health records or other hospital medical records systems has been reported as a challenge. Thus, a flexible system should be developed to

integrate with varying hospital records systems for optimal performance; especially in developing countries.⁸

Limited resources to attend to complaints

Due to the shortage of resources, many problems or complaints cannot be attended to promptly due to a shortage of technical and non-technical staff; especially, when the platform is imported with limited local expertise to run and maintain it. Thus, a customer care service using a SMS platform and a communication feature to handle reported problems will be desirable in the short term.⁸ In the long-term, local expertise should be developed through technical and/or knowledge transfer to have sustainable maintenance of the platform.

Connectivity issues

Many of the applications and tools require a good internet connection and might not optimally deliver in areas of sporadic internet connectivity; which varies within and between countries. This often affects synchronization, access and extraction of data for prompt decision-making. Thus, the application should have scheduled updates so that synchronization can be done automatically during good internet connectivity.⁸ Therefore, improving network infrastructure quality ensures the quality of health systems.

Sustainability and cost-effectiveness

Developing affordable and sustainable mHealth interventions will ensure the continuous operationality of the mHealth services. When the operational cost is unbearable, continuous use and maintenance of the tool in the long run might be doubtful. Therefore, the essence and utility of such tools might be lost. Thus, the need to have locally developed mHealth applications and tools is necessary to have significantly reduce capital and maintenance costs.

Overall, mHealth has the potential to significantly improve NCD prevention, management, and patient outcomes by leveraging the widespread accessibility of mobile technology to empower individuals to take an active role in their health.

Challenges should be assessed and attended to promptly for successful mHealth utilization.

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