

Technological Innovations for Aging Populations: What Are the Opportunities for Learning across Low- and High-Income Countries?

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What is the message?

The rapid growth in aging populations is a challenge faced by both high-income countries (HICs) and low- and middle-income countries (LMICs). This study offers examples of ways that HICs and LMICs can learn from each other, especially in the areas of technology and service design. LMICs, in particular, should focus on leveraging tools that are patient facing and facilitate self-management, monitoring, and care planning to address the needs of an aging population.

What is the evidence?

Review of programs documented by the Center for Healthcare Management Innovation.
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Introduction

Aging populations challenge current models of health service delivery, presenting an opportunity to enhance health systems in low- and middle-income countries (LMICs) and high-income countries (HICs). The number of people 65 years of age or older will triple by 2050, with most of the increase realized in developing countries.¹ This growth will be accompanied by a rise in complex chronic conditions, which require strong self-management and coordination between different levels of care to achieve good outcomes.²⁻⁴ An increase in complex chronic conditions has been associated with a rise in costs historically; however leveraging technologies to redesign health services has the potential to offset increased costs, and provides an opportunity for LMICs and HICs to learn from each other as they experiment with different approaches to provide affordable care.⁵

What can LMICs learn from HICs?

HICs have shown that key features of care models for aging populations with complex needs include careful targeting of patients most likely to benefit; comprehensive assessment of patient needs; care planning and remote monitoring; supporting self-care by patients and families; and coordination of care between providers and families.⁶ LMIC health systems can learn from HICs by devising low-cost models of care that incorporate these key features, emphasizing the development of patient-facing technologies that enable these functions,⁷⁻⁹ rather than expensive electronic medical records built for administrative purposes.¹⁰ The dearth of medical staff and training programs in care of the elderly in these settings suggests that self-management is a more feasible approach to improving care.

What can HICs learn from LMICs?

The mix of resource constraints, poor performance of existing systems, and a lack of regulation that characterizes LMICs can inspire novel approaches that can be instructive for HICs,⁵ including innovations for elderly populations.¹¹ However, organizations in LMICs are in the early stages of developing innovations focused on the elderly, as shown by a search of the Center for Health Market Innovations (CHMI) database. The CHMI online resource, which catalogues over 1300

innovative programs in LMICs, shows only 35 health programs targeting the elderly.¹²

Despite the low numbers, several key features stand out, particularly in the use of information and communications technology (ICT). Among the CHMI example, 12 use ICTs, often for remote consultations involving online video, phone, or text communications. For example, *DoctorFromHome* is a program based in India that provides patients with online video consultations with doctors and specialists 24/7 using a web-based platform compatible with desktops, laptops, and mobile devices. Both patients and medical providers can sign up to use this tool, making it easier to add new users and new types of services than if they were based in a specific hospital or clinic.¹³

In another example, *Caring Palms Health Care* in Nigeria developed a mobile application and website patients can use to schedule medical appointments and home visits, and upload prescriptions for home delivery. They have also designed a subscription plan specifically for the elderly.¹⁴

Another program, *Agewell Global*, uses ICTs and a peer support network to monitor health outcomes to support the elderly in their homes. Elderly companions visit seniors in their homes and are trained to use the *Agewell* mobile screening tool to collect information on health and wellbeing. The tool's algorithms will review collected data, which triggers tailored referral recommendations for medical and social services.¹⁵ A pilot of the program took place in South Africa in 2014 and several additional pilots have launched in the US and Ireland, suggesting that this technology can be deployed in a wide range of contexts.¹⁶ While these approaches are promising, there is much more to be done to address the needs of a rapidly growing global population.

How can technology help redesign health services for the elderly?

There are many new patient-facing technologies, but few target the specific needs of the elderly in either high-income or low-income contexts.¹⁷ High rates of concurrent health conditions⁴ and progressive physical and cognitive decline should be considered in the design of

digital tools for this group.¹⁸

A recent study explored the needs of frail elderly and their caregivers that could be addressed by a digital health advisor.^{19,20} Four key needs emerged, including the need to manage day-to-day tasks; preserve dignity and connections while adjusting to changes in health status; access accurate and easy-to-understand information on their health; and feel understood by their healthcare providers, family, and friends. Participants suggested features such as a metrics dashboard that collects and displays information on symptoms and signs, tools to connect patients remotely to medical practitioners, a care journal, and a shared calendar and task manager to facilitate coordination between patients and their care team.

A similar study for LMICs could highlight a different set of constraints for the frail elderly, but the desire for dignity, connection, and autonomy is common and not actively supported in most care settings. Digital tools that are inexpensive, durable, use voice and visual interfaces for those with low literacy, and support self-care and engage caregivers are likely to have huge benefit in low resource settings.

Many of the necessary features have been developed, but are found across a range of different tools that only address a subset of a person's needs.¹⁷ Technological innovations in HICs include a mobile device to improve primary health care for patients with complex chronic disease and disabilities,⁹ a fall-detection sensor for older adults that is linked to a smartphone application,²¹ and a tablet-based tool for waiting rooms that enables complex patients to set priorities for their primary care visit.²² In LMICs, the Chinese Aged Diabetic Assistant is a smartphone application that helps older adults with diabetes self-management, self-monitoring and health education.²³ The majority of chronic disease apps are downloadable for free, so cost may not be a major barrier going forward.¹⁷

Conclusion

Technological innovations provide an opportunity to tailor services to an elderly person's unique pathophysiology, their social circumstances, and their preferences. They can help manage complex information to support decisions by patients, caregivers, and providers. HICs have

provided large subsidies to purchase expensive digital solutions to support administrative functions in large institutions, and are only now adapting them to meet the needs of providers and patients.^{24,25}

LMICs can skip this phase and support either the development or distribution of digital tools to support patients and caregivers first, and then link them with providers. New models of care could emerge that leverage communities and families more extensively, since the social determinants of health and independence in the elderly extend well beyond health services.²⁶ Digitally enhanced services should prioritize what makes life worth living, facilitate communication with providers, and provide decision-support for people who either cannot access or afford specialized services. The technical capability exists, and tools could be built affordably; however governments will need to support the new models of care delivery that are needed to integrate an elderly person's system of health with the broader health system.

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