Point of care in your pocket: a research agenda for the field of m-health

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Introduction

Mobile health, also known as m-health,[1] has been defined by the Global Observatory for e-health of the World Health Organization (WHO) as "medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants and other wireless devices".[1] With global penetration of cellular services topping 87%, the opportunity for connecting with 6 billion people has brought significant enthusiasm, energy and media attention to the field of m-health.[2] Amidst this momentum, evidence for the health benefits of m-health has been built not through traditional, large-scale and time-intensive randomized controlled trials, but by a multitude of small pilot projects, particularly in low- and middle- income countries.[3] Rapid technological innovation has led to an enthusiastic proliferation of untested methods, which are small-scale and, for the most part, have little policy coordination.[3] To lay the groundwork for establishing an evidence base for the cost-effectiveness and programme utility of m-health innovations, we outline seven key recommendations aimed at reducing resource wastage and programme duplication.

1. M-health needs to develop an evidence base.

A frontier mindset fosters real and rapid innovation in mobile health. This fast, iterative approach should not be lost, especially given the speed with which mobile and wireless technologies evolve, but caution is warranted. Although well on track towards attaining its goal of reaching 1 million mothers by 2012, Text4Baby, a free mobile text service sponsored by Johnson & Johnson in the United States of America, is a case in point.[4] Launched in February 2010, Text4Baby, which provides free health information to pregnant women and new mothers, has gained wide media attention and has won awards from the United States Office of Science and Technology in 2010 and from the Public Relations Society of America in 2011. Yet formal results are still to be made available from a belated evaluation that was recently completed.[5] Whether the 3.5 million messages sent in 2010 were read, acted upon or in any way able to change behaviour is not known. Only 12% of the countries surveyed in 2011 by WHO's Global Observatory for e-health reported evaluating their m-health services.[1] Formal and rigorous evaluations of efficacy, effectiveness and cost-effectiveness of m-health programmes must be undertaken to ensure that time and money are not wasted on ineffective programmes and that the best practices of successful programmes are rapidly disseminated.

2. M-health systems should be interoperable with existing e-health initiatives.

M-health is emerging as a patchwork of incompatible applications.[3] Information technology (IT) and health information systems are often based on the use of devices that cannot communicate and share data with one another and have traditionally been characterized by a silo approach.[3] This lack of interoperability parallels the public health experience with vertical disease-oriented programmes.[6] There is a compelling argument that better outcomes can be achieved by tackling diseases through an integrated health systems strengthening approach.[7] Similarly, by enabling m-health systems to share information with one another as well as with broader e-health systems, we can improve efficiency, reduce the costs associated with data collection and provide patients with better care. In addition, benefits such as these may in fact be felt within the broader health-care system.[3] To achieve this will require strong cooperation, meaningful collaboration and adherence to international standards.

3. M-health should adopt and implement the same standards already present in e-health.

Several e-health standards are in use today. They were designed to facilitate the interoperability of health data between devices and IT systems used in health care. In order for different systems to share data, they must contain comparable information (data elements), employ comparable words (terminology) and use an agreed-upon way to communicate (messaging). M-health projects such as cellScope,[8] which enables light microscopy to be performed on mobile phones, make mention of the Digital Imaging and Communications in Medicine (DICOM) standard for the exchange of medical images. By upholding and implementing the DICOM standard, they provide an excellent example of how m-health can build on existing e-health standards. Most projects are not using this standard, nor the HL7 Clinical Document Architecture (CDA) for the exchange of electronic clinical documents (such as discharge summaries and progress notes). Adherence to privacy, security and confidentiality standards is also critical to the ongoing success of any m-health intervention. If m-health and e-health systems are interoperable and share common standards, integration costs could be better contained.

4. M-health should take a participatory approach.

Contemporary thinking in health care is that health care should be personalized, predictive, preventive and participatory.[9] M-health can facilitate this by providing a simple means by which patients can engage in decisions about their own health care. Programmes need to go beyond merely connecting patients with health-care providers. Many current m-health initiatives focus on outdated, unidirectional models of patient communication (e.g. exclusively collecting data, providing information

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or sending reminders). With m-health technology, patients can easily transmit data and commentary on their health and health care to their electronic health record, which allows for an ongoing and active health dialogue.[10] However, this ease of use introduces additional challenges in connection with the privacy and confidentiality of patient data and requires the development of appropriate legal policies and frameworks.[11] Research that evaluates the utility and cost-effectiveness of such a participatory care approach should be prioritized.

5. M-health should promote equity in health.

In high-income countries, m-health programmes have focused largely on supporting ageing populations through delivering prevention programmes and reducing health-care costs through home-based monitoring.[12] In low- and middle-income countries, however, m-health has been conceptualized much more broadly, as a way to promote access to health services for the socioeconomically and geographically disadvantaged. Irrespective of country, no m-health programme should unfairly discriminate against, marginalize or exclude people at the fringes of society. The very high mobile phone penetration rate of 79%[2] in low- and middle- income countries may nevertheless obscure inequities and patterns of exclusion. Equity issues in the field of m-health remain under-researched.

6. M-health programmes need to move towards sustainability.

The most common m-health initiatives among WHO Member States in 2011 were health call centres (59%), emergency toll-free telephone services (55%), management of emergencies and disasters (54%) and mobile telemedicine (49%).[1] Unfortunately, many of these programmes are small, unsustainable pilot projects. Although a little dated, a 2008 review of the m-health literature revealed that 84% of the published programmes were prototypes, pilots or tests.[9] The figure has probably improved since then, but it still points to an urgent need to find sustainable and cost-effective models for supporting and developing early exploratory m-health ideas and integrating them with local health care financing systems.

7. M-health needs to focus on health, not on the technology.

Debate exists as to whether m-health services should be designed to have the best coverage by using the lowest common denominator technology, such as text messages, or whether they should benefit from the advantages that can be gained by targeting the sensors and processing power of the latest generation smartphone. This discussion may be practical but slightly misleading. Technology changes so swiftly that spending undue amounts of time, energy and effort in this domain may be a waste. Technology can support, enable and trigger change, but it is only through the will and skill of dedicated people that solutions can be found to the health problems we wish to address. A strong collaborative evidence base that is coordinated at an inter-country level by key stakeholders in the m-health community would reduce wasteful expenditure on programmes of showing little evidence of effectiveness and would instead promote best-practice models.

Conclusion

M-health technology is exciting and attractive, but the real challenge lies in establishing country-level best practices that are both cost-effective and supported by rigorous research and evaluation. Policy-makers and funders must promote, legislate and fund programmes and interventions that integrate and build upon a common m-health framework. Fostering a synchronized, strategic global research agenda that is focused more heavily on evaluating the evidence for, and the impact and cost-effectiveness of, m-health services is imperative. International agencies like WHO and major funders of health-care research can be sources of crucial support to international coordination efforts and thereby contribute to high-quality health care for all. ■

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