mHealth: Vehicle for Health System Strengthening in Sri Lanka

Dr. Madapathage Gayan Buddhika **Senanayake**, MBBS, MD[1], Dr. Gunasena Sunil **Senanayake**, MBBS, MD[2]

[1]Junior Public Health Professional – Health System Management, Department of Health System Development, South East Asian Regional Office for World Health Organization, New Delhi, India; [2]Regional Advisor – Health System Management and Patient Safety, Department of Health System Development, South East Asian Regional Office for World Health Organization, New Delhi, India

Corresponding Author: buddhikaoffice@gmail.com

Sri Lanka has a unique primary healthcare system with diverse community based healthcare services. Emerging health challengers in sustainable development era needs to be addressed with special emphasis on universal health coverage.

mHealth technology is an evidence based intervention to cater the novel healthcare priorities. mHealth needs to be integrated into the existing health system functions, rather stand-alone resolutions. mHealth applications are used for behaviour change communication, point-of-care diagnosis, vital event registration, data collection, electronic health records, provider-to-provider communication, human resource management and supply chain management initiatives. Incorporating these mHealth interventions at community level are essential in resolving future health challengers in Sri Lanka.

Introduction

Health challenges in the modern world require different kinds of solutions. The use of new technology is one key element to fight against the global health burden. Innovative technologies are particularly useful in resource constrained settings, which provide cost effective resolutions. The discovery and rapid spread of mobile phone and wireless technology has the potential to change the mode of service delivery in healthcare.[1] Incorporation of novel technologies into health system can gain maximum results. The objective of this paper is to identify mHealth technologies that can be used to strengthen the health system in Sri Lanka.

Health system is defined as "all the activities whose primary purpose is to promote, restore and/or maintain health".[2] It includes service delivery, patient safety, human resource, information system, medical products/ vaccine, technology and health financing. Increase demand of public health issues have made health system function more complex and challenging. Shortages of qualified staff and narrow budget lines have given health systems to select robust, cost effective evidence based interventions to overcome this contest. Mobile health or mHealth is an element of electronic Health (eHealth) and it is one such component that has the capacity to have an impact on community health services.[3] Countries within the South-East Asian Region such as Bangladesh has already developed and enforced national health information technology policy with a main focus on mHealth initiatives to standardize and interoperate public health data collection with multisectoral approach.[4]

Country Profile

Sri Lanka is an island situated off the southern coast of India with a total population of 20.36 million.[5] Sri Lanka is classified as a lower middle income country with a Gross National Income of US$ 3440 in 2014[6] and it has achieved good health indicators despite being

a lower income country compared to other nations globally.[7] Of the total government expenditure 4.9% was spent on health, or 1.43 % of the Gross National Product. The Human Development Index for Sri Lanka was 0.702 in 2013.[8] Sri Lanka has a unique preventive primary healthcare system that goes down to the community level. The success behind good health indicators with a relatively low health budget was mainly due to the strong preventive health system. The system is managed by qualified health professionals from national level to the grass root level and it is further strengthened with inherently built health information management system coupled with quality monitoring and evaluation system. The focus was mainly given to the community based health services. These services are provided by two main community health workers at grass root level, i.e. Public Health Midwife (PHM) and Public Health Inspector (PHI). Public Health Midwife is a front line health worker whose primary responsibility is to provide maternal and child health services at community level. Public Health Inspector (PHI) also works at grass root level, and responsible for environmental, sanitation, disease surveillance and control of communicable disease activities in a defined community health area.[9]

Global Challenge

The United Nations General Assembly held in September 2015 has declared new sustainable development agenda for all countries form 2015 – 2030. Health is well positioned in the Sustainable Development Goals with a broad intention to "ensure healthy lives and promote well-being for all at all stages".[10] It highlights the importance of social determinants, where equity plays a key role with shifting health priorities. Health challengers for Sri Lanka in the next decade require different kinds of solutions. Rapidly increasing Non- Communicable Disease (NCD) burden, growing mental healthcare needs, rehabilitation/ palliative care services and remodelling the traditional maternal and child health services to meet the quality and equity parameters need a comprehensive integrated approach. The main emphasis should be to achieve 'Universal Health Coverage' by providing equitable quality health service, including promotive, preventive, curative, rehabilitative and palliative care without any financial suffering to anyone and special attention to most vulnerable.[11]

mHealth

mHealth is defined 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] Mobile phone and wireless technology is growing rapidly in Sri Lanka with high mobile cellular penetration from 27% in 2006 to 87% in 2011.[12] Mobile cellular subscriptions have increased to 103 per 100 people at the end of 2015.[13] The mobile phone technology has deeply grounded into the Sri Lankan socio-cultural context and reached well beyond health boundaries compared to other technologies and health infrastructure. Mobile health services range from conventional call centres, emergency toll-free telephone service to modern mobile telemedicine, mobile patient records, patient monitoring, community mobilization/ health promotion and decision support systems. All these mobile solutions have to be considered in a broader health system perspective rather than as isolated interventions.[1] It is the duty of the policy maker to explore the fundamental public health principles of mHealth interventions and improve health system performance in the areas of coverage, quality, equity and efficiency.[2]

mHealth is useful for different health services in different aspects and it can be used to strengthen the prevailing tasks more accurately with less time and add new tasks to expand services at ground level.[3] The use of mHealth in developing countries range from education, data collection, communication, outbreak tracing and treatment support.[14] Twelve mHealth innovations were identified among reproductive, maternal and child health arena to reinforce health systems with sound evidence.[4] The community health workers have to be utilized to deliver health interventions using this mHealth technology and these interventions can be readily modified according to the Sri Lankan context.

mHealth as a Health System Strengthening Tool

mHealth technology is a useful tool for client education and behaviour change communication. Community health workers can send appropriate and timely mobile health messages for their clients including pregnant mothers, patients with non-communicable diseases, family planning recipients and even to adolescent/youth groups. The short message service based behavioural change campaigns such as smoking cessation interventions have a proven efficacy compared to traditional methods in developed world.[15] It is the exact time to initiate mobile cessation interventions and motivational messages for good health habits through community health workers in Sri Lanka. Point of care diagnostics using mobile technology can be easily applied to diagnose HIV by

interpreting CD4 cell counts through mobile phones. Since HIV is regarded as a disease with stigma and discrimination it will be helpful to use community health workers to manage them within the community. Assessment of drug compliance is crucial, not only for HIV; but also for tuberculosis, malaria and chronic NCDs. Evidence from South India has shown the value of mHealth adherence interventions among HIV patients.[16]

The health information management at ground level is entirely paper based with complicated registers, records and returns. Community health workers devote much of their valuable time for paper based work resulting concerns on quality, completeness and timeliness of the data. Electronic data management using mobile phone by primary healthcare workers can drastically reduce the turnaround time for reporting at divisional, district and national level. This could be coupled with a digital vital registration system and electronic health record to build a longitudinal population information system.[4]

Community health workers are an essential resource to collect data for household surveys and demographic health surveys. The use of tables will provide opportunity for them to simultaneously upload the data during data collection without any time delay. Development of a unique electronic health record for each and every individual is essential and community health workers should have the ability to feed the relevant data at field level to this database. This can be further evolved to generate an attractive mobile application (app) that reminds key health related activities to respective individuals. Community health worker will be able to send a reminder regarding child's vaccination due date to their parents through this electronic system. This will enhance the compliance, improve coverage and minimize inequity. Evidence from Indonesia suggests that the electronic medical record system is useful incollecting data for scientific research and had increased treatment protocol adherence.[17]

Population screening and detecting high risk clients for NCD at community level can be done through PHMs/PHIs using mobile phone decision support protocols and checklists. These cost effective point-of-care decision support tools ensure standard quality care at community level. A study conducted in rural India has shown that mobile-based, point-of-care clinical decision support instruments are useful to identify cardiovascular disease risk in advance.[18] Under-utilization of primary healthcare

centres and over-utilization of tertiary care centres is a concern for the health system in Sri Lanka. Lack of laboratory and diagnostic facilities at primary care level encourage people to bypass these institutions and directly access tertiary care hospitals. This can be minimized by introducing provider-to-provider communication using mobile applications by establishing a connection between community clinics and central laboratories/ diagnostic centres at national level. This will minimize the cost and time for patients between testing and reporting results. Health workers at primary care level can interpret the test results sent by central level through electronic applications and can initiate appropriate referrals or treatment schedules according to national guidelines. The use of Tele-medicine in intensive care units in Thailand (Tele-ICU) connects the intensivist and critically ill patients in rural areas and act as a mediator to provide quality service coverage.[19] Scheduling of community services such as antenatal, postnatal home visits and field clinic visits through mobile devices according to priority needs is essential to provide accountable service delivery. This will save time for community workers and provide the opportunity for policy makers to re-orient their services according to national priority needs in a scientific manner. Providing voice messages, health promotion messages, audio or video clips, multi-media messages and relevant updates to health workers through mHealth technology is a useful training and educational guide for them. This can even be designed as a mode of continuous professional development programme.

Web based dashboards permit supervisory officers to analyse the progress of their subordinates at all levels. With global positioning system in place, it facilitates to trace field officers at community level, minimizing unnecessary field visits. Incorporating mHealth strategy to supply chain management allows smooth functioning of primary healthcare with daily stock updates (medicines, materials). Drug shortages can be minimized by allocating responsible health workers at health facility level and encourage timely ordering with regular electronic updates.[4] Hotlines and toll free call centres should be established 24 hours per day to enable clients to directly consult their health professionals for urgent matters.

Private health sector in Sri Lanka has made a step forward on mHealth initiative with assessing the effectiveness of monitoring patients with cardiac abnormalities outside hospital premises. The monitoring was conducted with an ECG belt, pulse oximeter

and blood pressure monitor. The results were encouraging that 60% of patients have identified that mHealth technology is useful and provided additional sense of security for them during monitoring.[20] There is wealth of evidence to suggest the effectiveness of mHealth in the advancement of public health as a health system strengthening device.[21]

Conclusion

mHealth interventions are dynamic ground-breaking approaches that can be used at community level through grass root community health workers. The lessons learnt from private sector will enhance the ability of service provision at primary healthcare through mHealth technology with efficient, equitable service delivery for everyone at all levels. It is the right time for the Ministry of Health in Sri Lanka to implement these mHealth innovations at community level to encounter the upcoming challengers within health sector with strong determination and effort.

References

1. World Health Organization. mHealth - New horizons for health through mobile technologies. Switzerland: World Health Organization; 2011.

2. World Health Organization. The World health report 2000 : health systems : improving performance. Geneva, Switzerland: World Health Organization; 2000.

3. World Health Organization - South East Asian Rgional Office. Strengthening community based healthcare services - Report of the technical consultation. New Delhi, India: 2015 15–16 June, 2015. Report No.

4. Labrique AB, Vasudevan L, Kochi E, Fabricant R, Mehl G. mHealth innovations as health system strengthening tools: 12 common applications and a visual framework. *Global Health: Science and Practice*. 2013;**1**(2):160–71.

5. Department of Census and Statistics. *Census of Population and Housing - Final Report*. Colombo, Sri Lanka: Department of Census and Statistics, 2015.

6. The World Bank. World Development Indicators: The World Bank Group; 2016. Available from: http://data.worldbank.org/country/sri-lanka

7. World Health Organization. World health statistics 2016: Monitoring health for the SDGs, sustainable development goals. Switzerland: World Health Organization., 2016.

8. Ministry of Health and Indigenous Medicine. Annual Health Bulletin 2013 - Sri Lanka. Medical Statistics Unit, Ministry of Health and Indigenous Medicine, 2013.

9. Ministry of Health and Indigenous Medicine. Annual Report on Family Health 2013. Family Health Bureau, Ministry of Health, 2014.

10. United Nations. Transforming our world: the 2030 agenda for sustainable development. United Nations General Assembly2015 September, 2015.

11. World Health Organization. Universal health coverage: World Health Organization; 2016. Available from: http://www.who.int/mediacentre/factsheets/fs395/en/

12. International Telecommunication Union. *International Telecommunication Union statistical market overview*: Sri Lanka: International Telecommunication Union; 2016 [cited 2016 May 24]. Available from: http://www.itu.int/net/newsroom/GSR/2012/reports/stats_sri_lanka.aspx

13. The World Bank. *Mobile cellular subscriptions*: The World Bank; 2016 [cited 2016 May 24]. Available from: http://data.worldbank.org/indicator/IT.CEL.SETS.P2

14. Hewapathirana R. mHealth: Evidence and Best Practices. *Sri Lanka Journal of Bio-Medical Informatics*. 2010;**1**(3):121–4.

15. Whittaker R, McRobbie H, Bullen C, Rodgers A, Gu Y. Mobile phone-based interventions for smoking cessation. *The Cochrane database of systematic reviews*. 2016;**4**:Cd006611.

16. Rodrigues R, Poongulali S, Balaji K, Atkins S, Ashorn P, De Costa A. 'The phone reminder is important, but will others get to know about my illness?' Patient perceptions of an mHealth antiretroviral treatment support intervention in the HIVIND trial in South India. *BMJ open*. 2015;**5**(11):e007574.

17. Wildeman MA, Zandbergen J, Vincent A, Herdini C, Middeldorp JM, Fles R, et al. Can an online clinical data management service help in improving data collection and data quality in a developing country setting? *Trials*. 2011;**12**:190.

18. Raghu A, Praveen D, Peiris D, Tarassenko L, Clifford G. Engineering a mobile health tool for resource-poor settings to assess and manage cardiovascular disease risk: SMARThealth study. *BMC medical informatics and decision making*. 2015;**15**:36.

19. Wacharasint P. The role of health information technology on critical care services in Thailand. *Journal of the Medical Association of Thailand = Chotmaihet thangphaet*. 2014;**97** Suppl 1:S127–31.

20. Groupe Spécial Mobile Association. *Remote monitoring as an mHealth solution in Sri Lanka*. Groupe Spécial Mobile Association (GSMA), 2012.

21. Waidyanatha N, Sampath C, editors. *mHealth Revolutionizing Public Health: An Economic Study*. 5th Communication Policy Research South Conference (CPRsouth5), Xi'an, China; 2010.