The role of mobile phone-based interventions to improve routine childhood immunisation coverage

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Routine childhood immunisation is one of the most successful and cost-effective public health interventions that have considerably reduced global child morbidity and mortality.[1] However, annually, an estimated 18·7 million children under 1 year of age do not receive basic vaccination as part of an expanded programme of immunisation (EPI) worldwide, and millions of children die from vaccine-preventable diseases.[2] Because of social issues and insufficient appreciation for immunisation, parents and caregivers forget or ignore the importance of immunisation or completing the entire series of vaccines. As a consequence, there is a continuation of the polio epidemic, large measles outbreaks, and high disease burden of vaccine-preventable diseases in children.[3] In *The Lancet Global Health*, Dustin Gibson and colleagues study[4] showed the effectiveness of SMS reminders coupled with incentives in improving immunisation uptake and timelines in Kenya.[4]

The rapidly growing advancements in mobile technology have revolutionised global connectivity with 7 billion mobile phone users worldwide, most of which live in developing countries.[5] The element of portability and sharing allows mobile phones to reach more people than through the internet alone, providing a great solution to challenges such as travel and complex intercultural contact.[5,6] A substantial proportion of the population living below the poverty line has access to mobile phones.[5] This has thus changed the mode of communication among people worldwide and provides a great potential for public health engagement. Mobile health (mHealth) and SMS-based interventions have successfully improved vaccination uptake in children.[7] Although incentives have been used before to improve health-care outcomes, Gibson and colleagues' study showed a statistically significant effect of mobile phone-based incentives coupled with SMS for improving immunisation coverage and timelines in a low and middle-income country (LMIC) setup.[4]

Given the mobile phone access and acceptability in LMICs, there is considerable potential for mobile phone-based interventions to improve immunisation coverage in such settings. Previous studies assessing the effect of texting on vaccination have largely focused on flu vaccination in children and adolescents in the USA.[8] There are limited data from LMICs on the role of mHealth-based SMS interventions in improving routine childhood immunisation coverage.[7] Most of these studies assessed the conventional one-way text reminders and only a few studies compared reminder messages with educational and interactive (two-way) SMS messages related to vaccination uptake.[9] However, in Gibson and colleagues' study SMS reminders as a stand-alone intervention did not improve immunisation coverage and the effect was only seen when SMS was combined with an incentive.[4]

Results from the present study also showed improvement in timelines for measles immunisation, which is scheduled at 9 months of age, almost a gap of 6 months from the last vaccine according to EPI schedule for LMICs.[4] Although the major focus up until now has been on reminder messages, the impact of educational or provoking messages and automated calls for vaccination coverage improvement might also have a high bearing and should be further explored. Furthermore, very few studies have looked at the feasibility of conditional cash transfer through mobile phones for improving immunisation timelines.[10] One major reservation for SMS-based interventions is the level of literacy of the caregivers receiving the message. Preference for phone calls over text messages in populations with low literacy and resource-constrained settings has been shown in a few studies.[5] Findings from a pilot study assessing the supplementary immunisation coverage using SMS text and automated calls showed a much higher response to the automated call (78%) than SMS text messages (3%; personal communication).

Mobile phone text messages in local languages, pictorial messages, and automated phone calls or interactive voice recording according to the local settings can also play an important part in improvement of routine childhood immunisation. Additionally, adding incentives, both as mobile money or airtime, can also have a positive influence on the immunisation coverage. Gibson and colleagues showed the greatest effect for improvement in coverage and timelines in the incentive group that received the equivalent

of US$2.[4] However, there is a cost implication for scaling and sustainability of this model at the country or programme level. Nonetheless, improving immunisation uptake according to the schedule and in time will not only decrease mortality and morbidity but also reduce supplementary immunisation activities.

Mobile phone-based interventions have a great potential to connect routine childhood immunisation services with parents and caregivers, particularly for resource constraint settings. However, a clear policy on mHealth-based interventions related to routine childhood immunisation, including conditional cash transfer through mobile phones needs to be explored. Furthermore, in order to scale up mHealth-based interventions, mobile phone numbers registries of caregivers of children eligible for routine childhood immunisation should be established while preserving privacy and confidentiality. New innovative and cost-effective approaches are required that will enhance communication, engagement in care, and coordination between care-seekers and health-care providers to improve routine childhood immunisation coverage in LMICs settings.

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