Indian J Med Res 137, June 2013, pp 1024-1026

Commentary

Are mobile phones the key to HIV prevention for mobile populations in India?

The article by Prem Kumar and colleagues in this issue[1] provides evidence for optimism in India's ongoing efforts to prevent HIV/AIDS but also highlights some persistent challenges that we face globally. The research presented is noteworthy for the probabilistic sampling method of over 1,600 truckers from transit halt points, which minimizes the bias toward higher rates of reporting HIV risk and exposure to prevention programmes that is more likely to occur with samples of convenience or from "hotspots" and prevention programme settings. Their results identified that a significant proportion of truckers are at increased risk for HIV infection and transmission, with around 3 per cent HIV prevalence. They reported 13 per cent truckers with HSV and almost 4 per cent with syphilis and both of these infections increase biological risks for HIV infection and transmission. About 25 per cent reported recent sex with sex workers (condom use data are not provided but unlikely to be close to "100%" goal that many programmes aim to achieve). These estimates might even be underestimated due to those truckers (about 11% of the total sample) who did not provide interviews or blood samples possibly due to elevated HIV risk or infection. Of even greater concern is that only 19 per cent reported previous HIV testing (almost half in clinical settings), about 8 per cent reported ever being contacted by NGO staff providing HIV prevention interventions with 6 per cent reporting only one contact, and much of those contacts appear to be associated with engagement with sex workers. As the authors note, NACO supports over 100 NGOs that are estimated to reach 60 per cent of the trucker population in India, which is consistent with a recent *Avahan* study[2]. Clearly the disparity between the findings of Prem Kumar *et al*[1] and previous work is alarming and demonstrates that there are significant gaps in reaching truckers with intervention, and perhaps also that truckers have not found intervention experiences particularly memorable. The study also demonstrates that the low rate of intervention exposure reported is not due to lack of interest or acceptance among truckers: 89 per cent of their sample gave blood spots for HIV/STI testing, among whom 86 per cent were willing to pay for oral HIV testing, 84 per cent were interested in pre-exposure prophylaxis (PrEP) and 76 per cent were willing to pay for it. Even if we assume that the 11 per cent who refused study participation would not be accepting of the prevention interventions assessed, at least 75 per cent of truckers from this representative sample were interested and willing to pay for prevention.

What broader implications can be drawn from these results on low exposure to HIV prevention interventions despite high interest by truckers and investment by NACO in targeted intervention? First, these challenges are not unique to India. Even in the United States, where there is also significant investment in HIV prevention and treatment programmes, HIV testing rates are nowhere near sufficient to identify all of those infected with HIV. It is estimated that at least 25 per cent of the people living with HIV (PLH) in the US have not been tested and do not know their HIV status[3]. When PLH are tested and identified, many do not engage consistently in preventive interventions or treatment until they develop symptoms of AIDS, typically about 10 years after becoming infected. In addition, given the validation that high adherence to ART (*i.e.*, >95% of doses) reduces HIV viral load to undetectable levels and virtually eliminates risk of HIV transmission (even without condoms), and given growing evidence for the efficacy of both pre- and post- HIV exposure prophylaxis (PrEP and PEP), there is a vigorous

movement towards "Treatment as Prevention" and "Test and Treat"[3]. This focus has been further elaborated into a model of "Testing, Linkage, Engagement, and Retention to Care", which comprises a "spectrum of engagement" or "prevention and treatment cascade": *(i)* HIV infected but unaware; *(ii)* HIV diagnosed; *(iii)* linked to HIV care (including prevention); *(iv)* retained in HIV care; *(v)* needing ART (via regular CD4 monitoring); *(vi)* receiving ART; and *(vii)* undetectable viral load. In the United States it is estimated that only 40 per cent of PLH are retained in HIV care and only 19 per cent have achieved undetectable viral loads[3]. This model and its benchmarks have highlighted significant needs to improve engagement, monitoring, follow up, and coordination across programmes and service providers, which is also significantly more challenging with truckers and other mobile populations such as migrant workers. A recent conversation with colleagues at an ART clinic in Kolkata, India, underscores this challenge (Personal Communication, June 15, 2012), in which truckers and migrant workers typically do not return to refill their ART medication for several months at a time and in the interim it is unknown if they are receiving ART at other clinics. If not, which is likely in many if not most cases, HIV viral loads can increase, treatment resistant strains of HIV can develop, and sexual intercourse with wives, sex workers, or other partners is more likely to transmit HIV.

Given the challenges in engagement and retention to care with non-mobile populations, how can we hope to maintain high levels of effective engagement with mobile populations? The mobile phone is likely one, if not the primary, key. It is estimated that nearly every adult in India will become a mobile phone owner over the next few years. Prem Kumar's and colleagues' research[1] found that 63 per cent of truckers owned mobiles in 2010, which would have surely increased over the past three years. Increasingly, mobiles are becoming essential tools for people around the world to coordinate their work, stay in touch with families, and potentially stay engaged in prevention and care. Prem Kumar and colleagues demonstrate important foresight in assessing acceptability of telephonic HIV prevention counselling and test result notification among truckers, 82 per cent of whom found this mode of engagement acceptable. However, the potential of the mobile phone extends well beyond communication with service providers. Recently, colleagues and I working on "mHealth" (mobile health) interventions for HIV and maternal and child health (MCH) reviewed the literature on mHealth interventions and found that while there have been relatively few but notable programmes targeting HIV and STD prevention[4], there have been dozens of programmes targeting MCH, including many implemented in India[5]. Notably, the needs of MCH interventions parallel those of the HIV prevention and treatment cascade, such as identifying and engaging pregnant women, linking them to prenatal care, retaining them in care through birth and the postnatal periods, and continuing follow up for child developmental outcomes. We identified six standardized functions of mHealth systems from the MCH case studies, which apply to both patients and service providers: (1) informing about health risks, healthy behaviours, and available resources; (2) training new behaviours by providing text messages, live and interactive voice calls, pictures, or even videos that model the desired behaviours; (3) monitoring behaviours in real time, including unobtrusive and automatic monitoring (*e.g.*, integrating mobile systems into a routine workflow) to reduce the burden of reporting; (4) shaping behaviours through monitoring, feedback, prompts and reminders, encouragement, and rewards provided in real time; (5) supporting development and maintenance of healthy behavioural or optimal service delivery routines by linking to peers, friends, family, or other healthcare workers for social support and instrumental support; and (6) linking to other services needed by the patient or the provider[5]. Although we framed our review around "smartphones" for their enhanced functionality and with a future orientation, we defined "smartphones" more broadly to include "smart systems" that use text-messaging (SMS) and interactive voice response (IVR) that can work on any mobile phone. Combining these standardized functions in integrated case-management and intervention systems provides a level of coordination and low-burden monitoring and evaluation data that has been infeasible or cost-prohibitive up to this point.

Currently, ICMR, NACO, the Ministry of Health, the U.S. NIH, USAID, and many other organizations and funders in India and around the globe are supporting development of mHealth systems. In some developing countries, such as Zambia, the entire country's health system has been built on an mHealth infrastructure, providing an electronic medical record available via mobile phones for every citizen engaged in the system[6]. Many of these mHealth programmes are built on open-source software code or platforms, meaning that there

are no proprietary barriers to using and adapting the software. Given the lack of proprietary barriers, India has a tremendous opportunity to leverage its software engineering capacities to the development of mHealth tools. In some cases, mHealth software companies have created web-based design interfaces that require no software coding expertise at all, only an ability to conceptualize or translate an existing paper form into an electronic form using a user-friendly drop-down menu interface. One notable mHealth company with strong presence in India (and a collaborator, for full disclosure) is Dimagi Inc. (*www.dimagi.com*), a U.S. based company with an Indian co-founder. Dimagi is notable as a "B Corp" non-profit focused on social benefit. As such, Dimagi has made one of its primary mHealth platforms called CommCare (*http://www.commcarehq.org/home/*) available to try for free, and is currently funded by USAID to support 40 rapid proof of concept trials with frontline health workers in India over the next two years (*http://www.commcarehq.org/div2/round1/*). CommCare, like many other mHealth platforms, is a case-management and care coordination system in which service providers can enter and retrieve patient information, receive prompts and guidance on services and procedures relevant to the individual patient, and from which patients can receive automated messages for tailored information and reminders. Such systems provide real-time data for supervisory and decision-making support, and monitoring and evaluation. There is tremendous optimism currently around the potential of mHealth tools to improve and scale-up health interventions. While this optimism may fade over time, it has never been as easy as it is currently to give innovation a chance to address the challenges and capitalize on the strong interest in health and prevention services identified by Prem Kumar and colleagues[1] and many others around the globe.

Dallas Swendeman
Global Center for Children & Families (GCCF)
Center for HIV Identification, Prevention & Treatment Services (CHIPTS)
Department of Psychiatry & Biobehavioral Sciences, David Geffen School of Medicine at UCLA
10920 Wilshire Blvd., Suite 350
Los Angeles, CA 90024, USA
DSwendeman@mednet.ucla.edu

References

1. Prem Kumar SG, Anil Kumar G, Poluru R, Schneider JA, Dandona L, Vemu L, *et al*. Contact with HIV prevention programmes & willingness for new interventions among truckers in India. *Indian J Med Res* 2013; *137* : 1061-71.
2. Pandey A, Mishra RM, Sahu D, Benara SK, Sengupta U, Paranjape RS, *et al*. Heading towards the safer highways: an assessment of the Avahan prevention programme among long distance truck drivers in India. *BMC Public Health* 2011; *11* (Suppl 6): S15.
3. Gardner EM, McLees MP, Steiner JF, Del Rio C, Burman WJ. The spectrum of engagement in HIV care and its relevance to test-and treat strategies for prevention of HIV infection. *Clin Infect Dis* 2011; *52* : 793-800.
4. Swendeman D, Rotheram-Borus MJ. Innovation in sexually transmitted disease and HIV prevention: Internet and mobile phone delivery vehicles for global diffusion. *Curr Opin Psychiatry* 2011; *23* : 139-44.
5. Rotheram-Borus MJ, Tomlinson M, Swendeman D, Lee A, Jones E. Standardized functions for smartphone applications: examples from maternal and child health. *Int J Telemed Appl* 2012; *2012* : ID973237, 16 pages.
6. Schuttner L, Zijdel W, Manda H, Shearer K, Siyingwa R, Theis M, *et al*. (2011, July). International AIDS Society Use of mobile phone-guided community outreach for integrated primary health care and HIV services in Zambia. Poster TUPE444, Sixth IAS Conference on HIV Pathogenesis, Treatment and Prevention, Rome, Italy. Available from: *http://pag.ias2011.org/Abstracts.aspx?AID=3308*.