EDITORIAL

WhatsApp and Internet Protocol messaging in healthcare: a transformative opportunity

R Duys,[1,2] **J Park-Ross,**[1,2] **D van Straaten,**[3] **E Grant, C Copley**[4]

[1] *Department of Anaesthesia and Perioperative Medicine, University of Cape Town, South Africa*
[2] *Division of Global Surgery, University of Cape Town, South Africa*
[3] *Safe Surgery SA, South Africa*
[4] *Cedar, United States of America*
Corresponding author, email: *rowanduys@gmail.com*

> *"... with great power there must also come—great responsibility!"* Uncle Ben, Spiderman comics, Marvel

Mobile messaging platforms (MMP) are increasingly the de facto vehicle for communication in low resource environments. The statistics are striking. Dramatic reductions in the cost of smartphone devices as well as data, mean that an estimated 44% of Africans had access to a smartphone in 2019.[1] This is anticipated to grow to 65% by 2025.[1] Access among healthcare workers is even higher, with 97% of the researchers approached through the African Perioperative Research Group (APORG) reported having smartphone access (unpublished data).

This rapid technology uptake presents a foundational opportunity in public health. Initial use cases for mobile phones in healthcare included one-way messaging using Short Message Service (SMS) technology to reach new audiences in novel ways.[2,3] But with the growing number of Internet Protocol (IP) or "over-the-top" instant messaging services (e.g. WhatsApp, Microsoft Messenger, Telegram, Viber, Signal, AliPay, etc.), new functionality has been unlocked. It is now possible (i) to hold real-time, two-way conversations directly with patients and practitioners at low cost and at national or even global scales, (ii) to distribute information in various media formats, and (iii) to enable data capture across wide and remote networks.[4,5] Furthermore, many of these platforms have made their application programming interfaces (APIs), or "back-ends", available to developers in order to offer increasingly customisable functionality. This also allows for messages to be sent, or data to be captured, by systems or "bots" rather than people. It is possible to develop responsive and adaptive services that are delivered over the messaging platform, in a similar way to apps used on Android or iOS operating systems.

The two key enabling factors of IP services are (i) their almost universal use among healthcare workers and patients, and (ii) the explosion in functionality, which have resulted in multiple use cases in healthcare. In this month's SAJAA, Sund et al.[6] report their use of WhatsApp's ease of use, prevalent use among colleagues and chat-group functionality to conduct a successful survey across a wide geographical area that would otherwise have been difficult, slow and possibly expensive to conduct. The South African National Department of Health used SMS, and now uses WhatsApp, to deliver one-way messages to an enormous user group of women receiving antenatal care through the MomConnect platform.[7,8] Messages are synchronised with gestation to ensure context-specific information. But more sophisticated healthcare interventions have also been delivered at scale, exploiting two-way messaging services and integrated data capture in applications ranging from chronic medication distribution tracking to mental health support and behaviour change (e.g. for vaccination uptake).[9,10] The Dimagi CommCare platform, deployed across 80 countries with a variety of applications, is another example of a holistic system delivered via mobile phone. It can integrate a healthcare worker education support and performance tracking system with two-way messaging, a case management platform or electronic health record, and has rapid evaluation and programme improvement cycles built in.[11]

While the potential is massive, there are a number of challenges and ethical considerations. Mobile phone users may not want to use their phones for health messaging for a number of reasons, including telephone sharing, data costs or simply user preference.[2,12,13] But recent interactions between one author (DvS) and a large group of African researchers during the roll-out of the African Surgical Outcomes Study (ASOS-2) trial suggested a willingness among a vast majority of collaborators to use both their mobile phones and their own data to contribute to the study.[14] This willingness was mirrored in the Sund et al. study.[6]

Data privacy is another consideration. While the content of messages are typically encrypted, much of the associated metadata can be used for other commercial purposes by the provider. In addition to this, data sovereignty is an increasingly important issue as data produced in these platforms are collected and aggregated in other countries with different data protection legislation. The full ramifications of this are beyond the scope of this article, and are constantly and rapidly evolving.

Choice of platform for healthcare interventions is also important. While it may be expedient to meet healthcare users on the platforms they already use, such as the use of SMS or WhatsApp in MomConnect,[15] when designing a system for a smaller group of collaborating professionals it may be possible to move the entire group to a different, fit-for-purpose IP, such as the Vula app for patient referrals in South Africa.[16,17] There are also risks

in designing an intervention that is platform specific. During the ASOS-2 trial, the choice of IP platform was often country specific (unpublished data). While WhatsApp is the most common platform in Africa,[1] its prevalence is not universal. Thus, interventions that are platform agnostic and can be implemented over the most appropriate IP service for the target audience, protects against the inevitable shifts in popularity and usefulness of IP services.

Mobile platforms must be used for research purposes keeping in mind normal research ethics practices, including patient confidentiality, informed consent, data storage and respectful interaction with all participants.[18,19] The ease of access to participants using mobile platforms presents notable advantages for conducting research but must be balanced against the risks of intrusive communication and inevitable resentment of messaging by participants, especially if messaging occurs after hours.[20,21] Consent to participate in research and contacting practices that are respectful of participants, are of critical importance when the medium for communication is so pervasive and integrated into participants' daily routines.

Universal access to mobile phones, widespread internet connectivity and growing IP functionality are changing how we deliver healthcare interventions. This is particularly true in low resource countries where, much as we have leapfrogged the need for roll-out of terrestrial telephones or traditional banks through mobile phone enabled applications, we may also leapfrog the need for electronic health systems that rely on significant installation costs and move straight to mobile digital technology enabled healthcare systems that exploit individual access and cloud computing.

However, while tech-heavy interventions and super-apps may have a great impact on patient outcomes in our context, most healthcare workers can reflect on the direct benefits that mobile phones and IP services bring them and their patients through the most basic requirement for human endeavour and collaboration: easy, instant communication. Thus interventions, much like Sund et al. use of WhatsApp group-chat for data collection,[6,22,23] are available to all healthcare workers and their patients immediately. We should use them wisely for the benefit of all.

References

1. GSMA Intelligence. The mobile economy 2019 [Internet]. London: GSMA Intelligences; 2019. Available from: https://www.gsmaintelligence.com/research/?file=b9a6e6202ee1d5f787cfebb95d3639c5&download. Accessed 12 February 2021.
2. Duys R, Duma S, Dyer R. A pilot of the use of short message service (SMS) as a training tool for anaesthesia nurses. SAJAA. 2017;23(3):69-71. https://doi.org/10.1080/22201181.2017.1317422.
3. Agarwal S, Perry HB, Long LA, Labrique AB. Evidence on feasibility and effective use of mHealth strategies by frontline health workers in developing countries: systematic review. Trop Med Int Heal. 2015;20(8):1003-14. https://doi.org/10.1111/tmi.12525.
4. Conradie A, Duys R, Forget P, Biccard BM. Barriers to clinical research in Africa: a quantitative and qualitative survey of clinical researchers in 27 African countries. Br J Anaesth. 2018;9(June):1-9. https://doi.org/10.1016/j.bja.2018.06.013.
5. Biccard BM, Madiba TE, Kluyts HL, et al. Perioperative patient outcomes in the African Surgical Outcomes Study: a 7-day prospective observational cohort study. Lancet. 2018;391(10130):1589-98. https://doi.org/0.1016/S0140-6736(18)30001-1.
6. Sund GC, Lipnick MS, Law TJ, Wollner EA. Anaesthesia facility evaluation: a Whatsapp survey of hospitals in Burundi. SAJAA. 2021;27(2):70-75. https://doi.org/10.36303/SAJAA.2021.27.2.2456.
7. MomConnect – National Department of Health [Internet]. Pretoria: South Africa National Department of Health; 2020. Available from: http://www.health.gov.za/momconnect/. Accessed 12 February 2021.
8. Wolff-Piggott B, Rivett U. An activity theory approach to affordance actualisation in mHealth: The case of Momconnect. Twenty-Fourth Eur Conf Inf Syst (ECIS), İstanbul, Turkey; 2016. p. 1-15.
9. McNabb M, Chukwu E, Ojo O, et al. Assessment of the quality of antenatal care services provided by health workers using a mobile phone decision support application in northern Nigeria: a pre/post-intervention study. PLoS One. 2015;10(5). https://doi.org/10.1371/journal.pone.0123940.
10. HIV ENGAGE | Aviro [Internet]. Cape Town: AviroHealth; 2020. Available from: http://www.avirohealth.com/projects/hivengage/. Accessed 12 February 2021.
11. Flaming A, Canty M, Javetski G, Lesh N. The CommCare evidence base for frontline workers [Internet]. 2015. Available from: http://www.commcarehq.org. Accessed 12 February 2021.
12. Aranda-Jan CB, Mohutsiwa-Dibe N, Loukanova S. Systematic review on what works, what does not work and why of implementation of mobile health (mHealth) projects in Africa. BMC Public Health. 2014;14(1):188. https://doi.org/10.1186/1471-2458-14-188.
13. Pimmer C, Tulenko K. The convergence of mobile and social media: affordances and constraints of mobile networked communication for health workers in low and middle-income countries. Mob Media Commun. 2016;4(2):252-69. https://doi.org/10.1177/2050157915622657.
14. ASOS – African Surgical Outcomes Study – About ASOS-2 [Internet]. Cape Town: Department of Anaesthesia and Perioperative Medicine, University of Cape Town. Available from: https://www.asos.org.za/index.php/about-the-study. Accessed 12 February 2021.
15. Barron P, Peter J, LeFevre AE, et al. Mobile health messaging service and helpdesk for South African mothers (MomConnect): History, successes and challenges. BMJ Glob Heal. 2018;3:1-6. https://doi.org/10.1136/bmjgh-2017-000559.
16. Morkel RW, Mann TN, Du Preez G, Du Toit J. Orthopaedic referrals using a smartphone app: Uptake, response times and outcome. SAMJ. 2019;109(11):859. https://doi.org/10.7196/SAMJ.2019.v109i11.13986.
17. Vula Mobile – Secure medical referral and chat [Internet]. Vula; 2021. Available from: https://www.vulamobile.com/. Accessed 12 February 2021.
18. Mars M, Morris C, Scott RE. WhatsApp guidelines – what guidelines? A literature review. J Telemed Telecare. 2019;25(9):524-9. https://doi.org/10.1177/1357633X19873233.
19. Morris C, Scott RE, Mars M. Security and other ethical concerns of instant messaging in healthcare. Stud Health Technol Inform. 2018;254:77-85.
20. Pimmer C, Rambe P. The inherent tensions of "Instant Education": a critical review of mobile instant messaging. Int Rev Res Open Distance Learn. 2018;19(5):219-37. https://doi.org/10.19173/irrodl.v19i5.3765.
21. Rambe P, Bere A. Using mobile instant messaging to leverage learner participation and transform pedagogy at a South African University of Technology. BJET. 2013;44:544-61. https://doi.org/10.1111/bjet.12057.
22. Martinez R, Rogers AD, Numanoglu A, Rode H. The value of WhatsApp communication in paediatric burn care. Burns. 2018;44(4):947-55. https://doi.org/10.1016/j.burns.2017.11.005.
23. Kauta NJ, Groenewald J, Arnolds D, et al. Where there is no orthopaedic surgeon: a WhatsApp mHealth platform to support fracture management by non-specialists in South Africa. J Am Coll Surg. 2019;229(4):e26. https://doi.org/10.1016/j.jamcollsurg.2019.09.008.