Mobile health for the secondary prevention of stroke

Globally, stroke is the second leading cause of death and the third leading cause of death and disability combined.[1] More than 75% of the global burden of stroke is now borne by low-income and middle-income countries (LMICs).[2] People with stroke are at a substantial risk of recurrence and mortality owing to cardiovascular events, which poses a challenge for health systems. According to a global estimate, among people with stroke, 11% might have recurrence within 1 year and 26% within 5 years.[3] Despite this risk and the availability of preventive medications, secondary prevention of stroke remains poor globally, particularly in LMICs.[4,5] Shortage of human resources for health in LMICs creates an additional challenge for stroke prevention and thus leveraging technology to help in disease prevention becomes imperative. One of the key ways in which these preventive measures can be adopted is by using mobile health (mHealth) technologies.[6,7]

In this issue of *The Lancet Global Health*, Pandian and colleagues[8] present their findings from a multicentre, randomised-controlled trial of a semi-interactive mHealth intervention among patients with subacute stroke. The study was done across 31 stroke centres in India. The trial's intervention was a package composed of SMS text messages, health education videos, and stroke prevention workbooks for patients. Of note, the researchers systematically developed awareness material in 12 different regional languages. The patients in the control group received standard care. The primary outcome was a composite of recurrent stroke, high-risk transient ischaemic attack, acute coronary syndrome, and all-cause mortality 1 year after the intervention. Some of the key secondary outcomes were alcohol use, tobacco use, and medication compliance.

To our knowledge, the study is the first trial in India (and perhaps globally) to try to assess the role of an mHealth intervention in secondary prevention of stroke at such a large scale, and the authors should be congratulated for such an effort. Previously, mHealth trials on secondary prevention of stroke have focused on intermediate outcomes such as functional independence, medication compliance, and blood-pressure control.[9] In this trial the investigators went a step further and assessed the effect on endpoints such

as the recurrence of cardiovascular events and death. As for the design of the trial, it had fair randomisation and a reasonable representation of patients from rural areas, in which secondary prevention of stroke remains dismal.[5] There was little loss to follow-up among patients despite the intervening COVID-19 pandemic.

The results of the trial were negative and the primary outcome occurred in 128 (5·9%) patients in the intervention group and 113 (5·3%) patients in the control group (adjusted odds ratio [OR] 1·12; [95% CI 0·85–1·47]). The trial was stopped prematurely owing to futility. An encouraging finding was that the intervention did show some beneficial effects on secondary outcomes, such as reductions in alcohol use (adjusted OR 0·64 [95% CI 0·44–0·91]), smoking (adjusted OR 0·65 [0·44–0·94]), and missed medications (adjusted OR 0·60 [0·46–0·79]) compared with the control group. These gains could be particularly useful in resource-constrained settings. The findings also align with the global evidence that mHealth technologies improve medication compliance among patients with stroke.[9]

There are some factors that could have contributed to the negative results. The duration of follow-up was short (1 year) and the trial was conducted at stroke centres, where the overall amount of care was high and thus the value added by the mHealth intervention could be small. Typically, the interventions that reduce cardiovascular events after stroke, such as statins and blood-pressure control, tend to do so after 2–3 years of follow-up.[10,11] It is also possible that this mHealth intervention could be beneficial for resource-poor settings in which the overall organisation of post-stroke care is suboptimal, a reality in most parts of LMICs. One cause of concern, as far as the intervention is concerned, was that the uptake of SMS and videos by patients declined over time, which might point to dwindling interest in the content. This outcome underscores the need to use the contents of the intervention in a strategic manner, for example, using the messages and videos sequentially, or creating various combinations of messages and videos to make them more entertaining and to sustain interest.

To summarise, despite the negative primary outcome, the trial shows the feasibility and acceptability of an mHealth intervention for stroke prevention and a

glimmer of hope in improving lifestyle and medication compliance. A longer trial with a modified intervention to address existing shortcomings is certainly warranted. This trial should reinvigorate the efforts to develop and evaluate mHealth interventions for secondary prevention of cardiovascular events and death among patients with stroke, a global health problem.

We declare no competing interests.

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