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Can technology help improve diarrhoea management?

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Diarrhoeal diseases continue to account for a substantial proportion of deaths and morbidity in young children globally.¹ Despite vast knowledge around prevention and management, the burden remains high and, in particular, coverage rates of oral rehydration therapy remain stagnant at around 40% globally.² Despite adequate guidelines from WHO on appropriate management of dehydrated cases of diarrhoea in hospitals, there is concern that quality of care for childhood diarrhoea varies considerably and might contribute to persisting diarrhoea morbidity and mortality globally.³

In *The Lancet Digital Health*, Ashraf Khan and colleagues⁴ randomly assigned ten district hospitals in Bangladesh for triage emergency room physicians to use different decision support tools for the WHO guidelines on diarrhoea management: electronic, in the form of a rehydration calculator on a hand-held device, or paper, in the form of a pocket card. The study included 2487 adults (≥ 20 years) and 2488 children and adolescents (a third of whom were aged 2–59 months) with uncomplicated acute diarrhoea. The authors found no statistical difference between electronic and paper decision support for rates of intravenous fluids ordered by physicians. The study had several limitations, including the small number of hospitals (clusters), insufficient power for age-stratified outcomes, seasonal differences in the pre-study and post-study analysis, and a relatively small group of physicians directly observed for practice and compliance. Notwithstanding these issues, the investigators report some interesting trends. They documented higher intravenous fluid volumes administered to children with severe dehydration with the use of the rehydration calculator (0.0620 L/kg vs 0.0475 L/kg using the pocket card); the ratio of ratios between the electronic and paper decision supports was 1.50 (95% CI 1.11–2.01). They also observed a 28.5-point decrease in non-indicated antibiotic use for patients younger than 5 years when using the rehydration calculator (97.2% to 68.7%) versus a 23.8-point increase when using the pocketcard (43.1% to 66.9%), although this particular analysis was not prespecified. Overall, the electronic decision-support tool was well accepted by hospital staff, an important consideration in introducing any new technology.

The observation that antibiotic use rates went down during the intervention is an important finding and could

have potential public health implications. Widespread use of inappropriate antibiotics is a well recognised risk factor for emergence of antimicrobial resistance among enteric pathogens⁵ and adds to the cost of illness. Previous studies of the use of zinc for the treatment of diarrhoea in community settings in Bangladesh have also shown a reduction in antibiotic prescribing and use,⁶ perhaps due to replacement. In the current study, Khan and colleagues⁴ also observed a non-significant increase (7 percentage points) in the prescription of zinc among children younger than 5 years in the paper decision-support group (compared with a 2-point decrease in the electronic decision-support group), which could have also contributed to reduced concomitant use of antibiotics.

These data add useful information to the body of knowledge on the use of ancillary training aids to improve quality of care in health systems in low-income and middle-income countries. Poor quality of care within health systems has been shown to have accounted for at least 8 million amenable deaths in low-income and middle-income countries in 2015, costing at least US\$6 trillion in economic losses.⁷ A major component of this poor quality in health systems relates to staff training, workload, and motivation. Thus, strategies to improve their knowledge, skills, and performance are a crucial piece in addressing the quality gap.

Several methods have been applied to address this issue with variable impact. These include traditional system of audits and feedback, use of checklists, and increasingly, the use of technology for immediate as well as regular feedback. In a large effectiveness trial across 60 paired facilities in 24 districts of Uttar Pradesh (India), the use of a fairly intensive 8 months of coaching-based clinical support using a WHO Safe Childbirth Checklist was seen to improve adherence to essential birth practices, but did not affect perinatal or maternal mortality.⁸ By contrast, a clinical information network of 13 hospitals in Kenya with regular data collection, central processing, reporting back every 2–3 months, and biannual meetings led to a significant improvement in the paediatric admission quality-of-care score for children with diarrhoea and dehydration.⁹ There is thus a continued need for developing strategies for improving quality of care and the use of technology, particularly applications on daily-use devices such as mobile phones and tablets.

Such technologies are clearly important in helping the world to face many new challenges; in this case, they might allow us to make preventable diarrhoea deaths history.¹⁰

I declare no competing interests.

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