A GACD Implementation Science e-Hub Case Study

SINEMA Initiative: mHealth Intervention for Secondary Stroke Prevention in Rural China

This case study was developed based on the work of

SINEMA (System-Integrated and Technology-Enabled Model of Care) study.

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Case study summary

The SINEMA initiative in rural China deployed a multifaceted mHealth intervention to address the unmet needs of community-dwelling stroke survivors. This program integrated mobile health technologies with primary care services, providing structured support to both healthcare providers and patients. By leveraging an Android-based application for village doctors and automated voice messages for patients, the intervention aimed to improve medication adherence, promote physical activity, and support evidence-based secondary prevention strategies.

The cluster-randomised controlled trial demonstrated a modest but significant reduction in systolic blood pressure (SBP), enhanced medication adherence, and improved functional outcomes. The SINEMA intervention underscores the potential of mHealth tools to strengthen primary care systems in resource-limited setting.

Identification and characterisation of implementation issues

Healthcare challenge: Stroke remains the leading cause of death and disability in China, with rural areas facing disproportionately higher burdens due to suboptimal care systems and poor adherence to secondary prevention measures. In these regions, fragmented healthcare infrastructure and limited provider capacity hinder effective management.

Systemic issues: Barriers included low levels of provider training, lack of electronic health records, and patients' limited awareness of secondary prevention strategies. Patients frequently failed to adhere to medications and physical rehabilitation due to forgetfulness, lack of reminders, and insufficient knowledge.

Selection, adaptation, and application of implementation strategies

mHealth-enabled primary care: The SINEMA intervention combined a provider-facing Android app and patient-facing voice messages. The app equipped village doctors with evidence-based tools for medication management, physical activity guidance, and patient education. Patients received daily voice messages in their local dialect, providing reminders and health education.

Iterative design and contextualisation: The intervention's development followed a user-centred approach, involving iterative feedback from village doctors, stroke patients, and caregivers. Messages were tailored to local dialects, cultural contexts, and literacy levels to ensure accessibility and acceptability.

Development and delivery of the stakeholder engagement strategy

Collaborative framework: The SINEMA program was implemented through partnerships with local healthcare providers and authorities. Training sessions for village doctors, delivered by county hospital neurologists, enhanced provider capacity to deliver evidence-based care.

Community involvement: The program design was informed by in-depth interviews with 22 stroke patients, 10 caregivers, and 12 village doctors. This engagement ensured alignment with community needs and preferences.

Evaluating implementation

Methodological framework: The SINEMA intervention was evaluated via a cluster-randomised controlled trial in 50 villages, involving 1,299 stroke survivors. Primary outcomes included SBP change over 12 months, with secondary measures assessing medication adherence, physical activity, and functional outcomes.

Impact assessment: The intervention achieved a significant SBP reduction (adjusted mean difference: -2.8 mmHg), increased adherence to statins and antihypertensive medications, and improved physical activity levels. Stroke recurrence and hospitalisation rates were also significantly reduced in the intervention group.

Results and key findings

Blood pressure and medication adherence: Participants in the intervention arm experienced improved SBP control and significantly higher medication adherence rates compared to controls.

Functional outcomes: Intervention participants showed improved mobility (measured by the Timed Up and Go test) and self-reported quality of life.

Strength and Limitations

Strengths

- The SINEMA initiative combined provider and patient-facing technologies, addressing systemic and individual barriers simultaneously.
- The intervention was low-cost (US$24.3 per participant per year) and demonstrated scalability for similar resource-limited settings.

Limitations

- The trial's 12-month duration limits insights into long-term sustainability and effectiveness.
- Generalisability may be constrained by the unique socio-economic characteristics of the study region.

Success factors and challenges

Success factors: The program's integration of tailored mHealth tools and provider training, combined with strong community engagement, drove its success.

Challenges: Addressing patient non-adherence and sustaining provider engagement remain critical challenges for scale-up.

Next steps

Scale-up and policy integration: Future initiatives aim to adapt the SINEMA model for other chronic conditions and resource-limited settings, integrating findings into national health policies.

Long-term sustainability: Ongoing efforts will focus on refining the mHealth system, addressing identified barriers, and conducting longer-term evaluations.

References

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Key learning objectives

1. Understand how integrating mHealth tools, such as provider-facing apps and patient-directed voice messages, can enhance secondary stroke prevention in rural, resource-limited settings by addressing systemic and individual barriers.
2. Recognize the importance of user-centred design and community involvement, including tailoring interventions to local dialects and cultural contexts, in ensuring accessibility, acceptability, and effectiveness of healthcare interventions.
3. Learn how structured training for healthcare providers and collaboration with local stakeholders can improve care delivery, medication adherence, and health outcomes for stroke survivors in fragmented healthcare systems.