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MALAWI | **mHealth**

Evaluating the Cost-effectiveness of Mobile Decision Support Tools: A Malawi Case Study

Mobile applications are promising tools to strengthen service quality and have been an area of considerable innovation. Broader adoption of mHealth initiatives is hampered by a lack of knowledge of their value for money (WHO 2011). There is a paucity of evidence on the cost-effectiveness of mHealth technologies (Braun, 2013). USAID's Health Finance and Governance Project (HFG), in partnership with D-tree International, a health NGO, and Catholic Relief Services, analyzed the costs of developing and scaling a mobile decision-support application and its effect on adherence to the recommended protocol for integrated Community Case Management approach to child health.

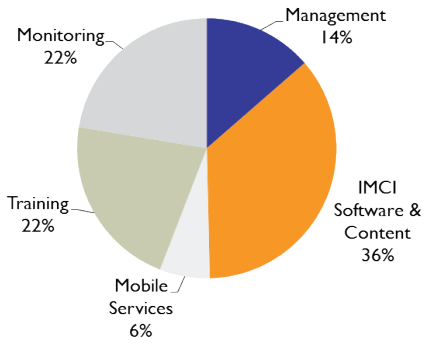
The mobile tool was associated with significantly better quality of care than the existing paper-based system, as defined by greater clinical adherence to protocols.

Methodology

Comprehensive cost data was collected for the period of October 2010 through March 2013 for planning, developing, testing, training, managing, and monitoring the mobile application to 50 health surveillance assistants (HSAs) within the Malawi Ministry of Health. No costs were calculated for the control group using standard paper-based registries and job aids because the mobile application supplemented but did not replace paper reporting. Using a convenience sample of 25 HSAs using the mobile tool and 25 HSAs using only paper-based registries, effect data was collected on follow-up diagnostic questions, and treatment and medication dose for medical conditions with 1250 patients. The study assessed the mobile tool's incremental cost-effectiveness, relative to the standard paper-based system, by measuring the cost per a one percent change in the proportion of children correctly diagnosed and treated per HSA.

Results

The total cost of designing and implementing the mobile decision support tool for 50 HSAs amounted to $175,678. **Labor costs accounted for roughly 73 percent** of total costs (categorized in chart below), followed by other direct costs at 13 percent. **Effect data** showed little room for improvement in whether HSAs asked follow-up questions or whether the correct drug was given, and there was no difference in the referral rate. The mobile tool was associated with **greater accuracy in treatment dosage** decisions and created conditions for **more systematic** and complete documentation of case management. HFG found that compared with the existing paper-based system, the mobile tool costs an additional $10.43 for an HSA to improve his/her diagnostic and treatment accuracy by 1 percent. Through scale-up scenarios in which the fixed costs of the mobile intervention are spread over a projected 5000 HSAs, the cost per HSA per year would decrease to $1.07 per percent improvement.



Study Limitations

Limited effect data and oversight of health providers made it impossible to assess the accuracy of diagnosing patient medical conditions, such as appropriate referrals for severe health conditions. It is also feasible that HSAs using the paper-based registries may have incorrectly recorded data on dosage by misinterpreting instructions, versus the mobile interface which helps HSAs record data correctly. Sensitivity analyses were conducted to account for this possible bias in the results, resulting in a finding of no statistically significant difference in the diagnosis and treatment accuracy between the two groups.

Research and Policy Considerations

Total Cost of mHealth and the Importance of Scale

The total costs of developing and deploying a mHealth application is often underrepresented in mHealth budgets, which focus on software licensing, phones and data plans. HFG detailed and transparent analysis of project costs for planning, stakeholder relations, and program management highlights the high upfront labor costs incurred by mHealth pioneers to design, refine and deploy interventions. As demonstrated by the scale-up scenario, these non-recurring development costs can provide "sticker shock" at the pilot level, but decline dramatically per HSA at scale.

Expanding Functionality of mHealth Applications

The mobile application evaluated in this study was designed and deployed five years ago and has long since been superseded by enhanced versions, with new content modules, improved data capture, analysis and visualization, and automated client contact and follow-up. Integration of the additional features required modest additional costs for software development and data use, and leveraged existing investment in devices, training and support. Each additional function of the tool provides potential clinical effects as well as net program costs savings. Methodologies are needed to define, measure, and integrate these interlinked benefits so that they can be presented as incremental cost-effectiveness ratios. Cost-benefit analyses offer one solution for future research, as they derive a monetary value for each effect

Conclusion

The decision-support mobile application evaluated in this study demonstrated that the estimated $1.07 cost per health worker at scale is effective in improving accuracy of treatment dose, but paper based methods were equally effective in assessing clinical severity and referring cases presenting danger signs. The primary contribution of this study is the documentation of a systematic methodology and study design for evaluating the cost effectiveness of a mHealth application. To determine whether the investment in this case reaches a threshold of cost-effectiveness, policymakers would need to consider overall budget expenditures and baseline quality indicators for iCCM deployment, and data on cost-effectiveness of alternative interventions to improve adherence to iCCM protocols.

Access to the full study can be found at www.hfgproject.com.

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The Health Finance and Governance (HFG) project works with partner countries to increase their domestic resources for health, manage those precious resources more effectively, and make wise purchasing decisions. Designed to fundamentally strengthen health systems, the HFG project improves health outcomes in partner countries by expanding people's access to health care, especially priority health services. The HFG project is a five-year (2012-2017), $209 million global project funded by the U.S. Agency for International Development under Cooperative Agreement No: AID-OAA-A-12-00080. The HFG project is led by Abt Associates in collaboration with Avenir Health, Broad Branch Associates, Development Alternatives Inc., Johns Hopkins Bloomberg School of Public Health, Results for Development Institute, RTI International, and Training Resources Group, Inc.

For more information visit **www.hfgproject.org/**.

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