INNOVATIONS IN HEALTHCARE™

Transforming Rural Healthcare in Rwanda with a Centralized Electronic Medical Records System

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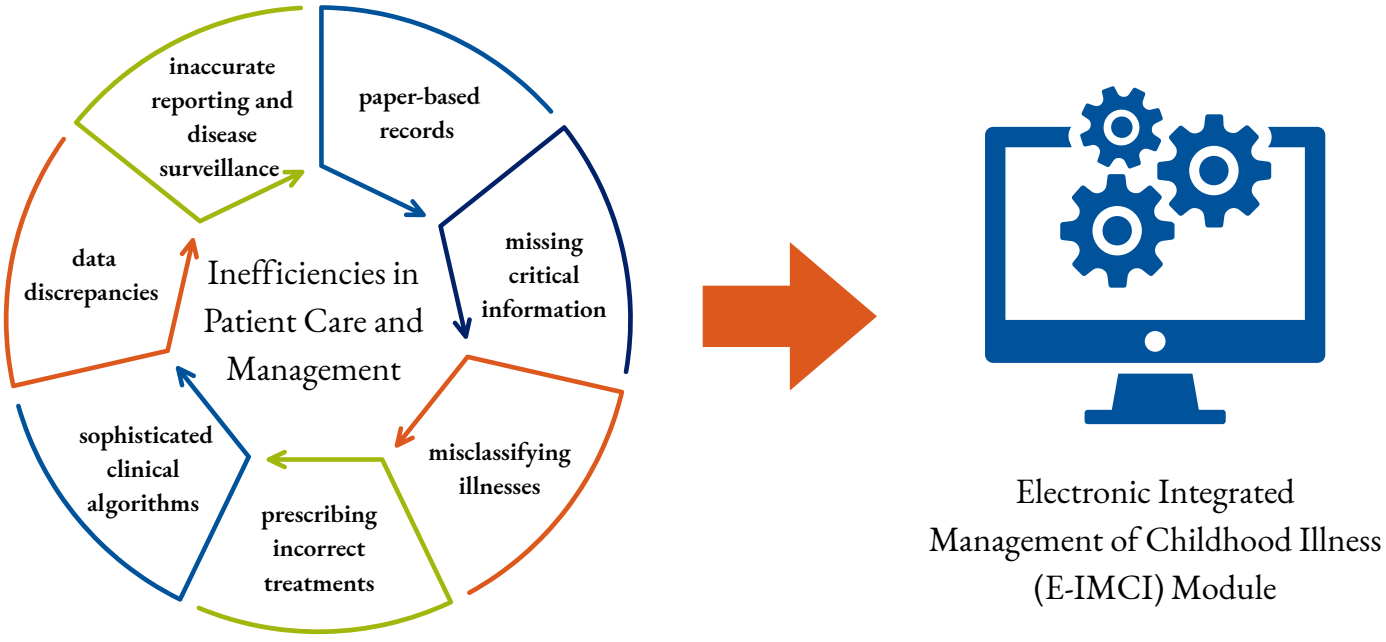
Introduction

The World Health Organization (WHO) and the United Nations International Children's Fund (UNICEF) developed the Integrated Management of Childhood Illness (IMCI) strategy to decrease child mortality and morbidity associated with childhood illnesses. This strategy implements three fundamental approaches to reduce child mortality and morbidity: 1) enhancing healthcare providers' case management skills, 2) strengthening health systems to deliver high-quality care, and 3) promoting family and community health practices to foster better health, growth, and development.[1] Rwanda adopted the IMCI strategy and has seen an overall decline in childhood mortality from 152 per 1000 live births in 2005 to 50 per 1000 live births in 2019. However, the country continues to experience child morbidity and mortality caused by malaria, pneumonia, and other respiratory diseases.[2] The lack and/or shortage of skilled health workers, poor leadership and governance, medical supplies stockouts and insufficient health systems further worsen the implementation of the IMCI strategy.[3,4]

Since 2019 Health Builders—a Rwandan non-profit organization that strengthens health systems in collaboration with the Rwandan Ministry of Health (MOH)—has supported three rural districts, Rwamagana, Rulindo, and Nyabihu, to strengthen child healthcare through training of primary healthcare workers on IMCI and Integrated Community Case Management (ICCM) respectively. The MoH has partnered with Health Builders due to their alignment with national health priorities and innovative use of an Electronic Medical Records (EMR) system. As a member of the technical working group, Health Builders ensures the EMR system meets best practices by providing technical guidance, overseeing module development, and training healthcare personnel to improve service quality.

Challenge addressed by Health Builders

Healthcare providers in Rulindo District faced significant challenges using paper-based records for patient assessments, treatments, and education data. The manual process was not only time-consuming but also prone to errors, leading to inefficiencies in patient care and management as healthcare providers had to refer to sophisticated clinical algorithms, which are difficult to follow for most healthcare workers, especially those with no training in following clinical protocols and algorithms. Additionally, healthcare providers had to juggle multiple documents, from clinical algorithms to growth charts and immunization calendars. Thus, providers found themselves susceptible to errors – missing critical information, misclassifying illnesses, or prescribing incorrect treatments. The ripple effects extended beyond individual care, with data discrepancies hampering accurate reporting and disease surveillance efforts.



With funding from Pfizer Foundation through the 2023 Global Health Innovation Grant, Health Builders purposed to enhance the quality of care, streamline facility management, and unlock the power of accurate data for evidence-based decision-making using their EMR system in the Rulindo district.

At the heart of this initiative lies the electronic Integrated Management of Childhood Illness (e-IMCI) module —a digital solution that automates intricate clinical algorithms for assessing and managing childhood illnesses such as pneumonia, diarrhea, malaria, and malnutrition. This module, integrated into the EMR system, not only digitizes the IMCI protocols but also provides real-time data on patient health, treatment plans, and outcomes. By automating the protocols and guidelines into the EMR system, Health Builders has empowered healthcare providers, many of whom lacked specialized training, to deliver accurate diagnoses and appropriate treatments confidently and more efficiently.

> *"As healthcare providers, it was very challenging for us to deliver optimal care to children using the printed IMCI protocols. The process involved referring to so many documents at the time of consultation, including the IMCI booklet and other clinical guidelines, calculating doses, filling in the register, etc., which often led to confusion and inefficiencies during consultations. Now, Health Builders, in partnership with the Ministry of Health, have recently introduced a new EMR system for IMCI. This innovative system simplified the process of providing high-quality care for children during consultations and facilitated the process of collecting, storing, reporting and use of health information, making it easier for healthcare providers to make clinical decisions and monitoring of health outcomes"– Naomie, a nurse at Tare Health Center.*

Impact

Health Builders aimed to transform pediatric care by developing an electronic application for the IMCI. This application seeks to enhance adherence to clinical protocols among primary healthcare providers. Initial assessments undertaken by Health Builders revealed significant gaps. Only 77% of clinical assessments and 79% of treatment prescriptions were accurate, leading to misdiagnoses in two out of ten consultations for children under five.

To address these issues, Health Builders partnered with the Ministry of Health (MoH) to integrate the IMCI module into the national Electronic Medical Record (EMR) system, managing illnesses such as malaria, diarrhea, pneumonia, and malnutrition, which are major causes of infant mortality in Sub-Saharan Africa5, while working with health experts.

The application underwent a comprehensive validation process, including four days of User Acceptance Testing (UAT) with 124 case scenarios. It achieved 100% agreement in assessments and treatments against expert evaluations. After a minor 1% correction in reporting accuracy, it was recommended for deployment in health centers. In the subsequent phase, 100 healthcare workers completed three days of training. All participants found the system user-friendly and felt it would improve care for children under five.
Six months into the pilot program, 2,191 consultations had been conducted. Healthcare workers reported that the application improved assessment accuracy, diagnosis, treatment decisions, and patient counseling. Additionally, 64 children who had missed vaccinations were successfully reintegrated into the immunization program, highlighting the EMR system's impact on healthcare service quality.

Beyond clinical care, Health Builders collaborated with the MoH and Rwanda Biomedical Center to launch health education campaigns focused on disease prevention and vaccination importance for children under five. These semi-annual campaigns reached over 100,000 individuals, promoting community health awareness.

> *Designed for consultations involving children under five, the e-ICMI module automates national clinical algorithms to enhance decision-making in pediatric care. Since its implementation, healthcare workers have noted improved accuracy in Health Management Information System (HMIS) reporting, reduced reporting time, and better adherence to clinical protocols, particularly benefiting resource-limited facilities.*
> *-Sylvere Mugumya, Rwanda Ministry of Health*

Lessons Learnt

Health Builders' efforts towards developing and implementing the e-IMCI system across health facilities in Rwanda demonstrated the importance of both a robust technical platform and trusting and strong partnerships with the government. **Digitizing clinical algorithms is not only effective but also immensely beneficial**, especially for healthcare workers with limited training. This approach facilitates better decision-making and improves the overall quality of care. **Strong collaboration with government entities is crucial for the success and sustainability of these digital interventions**, ensuring that they are well-supported and integrated into the broader healthcare framework. Furthermore, **integrating the new Electronic Medical Record (EMR) system with other health management systems**, such as Health Management Information Systems (HMIS), electronic Logistics Management Information Systems (e-LMIS), and e-Tracker, can streamline processes and enhance efficiency across the healthcare continuum. This holistic approach ensures a more cohesive and effective healthcare delivery system.

Opportunities for Social Enterprises

Looking ahead, this pilot highlights opportunities for social enterprises to aid advancements in the healthcare sector, specifically by:

- **Developing training curricula that incorporate electronic Integrated Management of Childhood Illness (e-IMCI)** can greatly enhance healthcare providers' practical skills.
- **Extending electronic systems to Community Health Workers (CHWs) can enable** social enterprises to help CHWs in making more accurate clinical decisions and improving the quality of care at the community level.
- **Conducting comprehensive studies** to evaluate the effectiveness and cost-effectiveness of Electronic Medical Record (EMR) systems with automated algorithms, as opposed to those without, can yield valuable insights that guide future implementations.

Conclusion

Implementing the centralized EMR system in rural Rwanda has significantly transformed healthcare delivery, particularly in managing childhood illnesses. This initiative has improved the efficiency and accuracy of healthcare services and demonstrated the power of technology and collaboration in overcoming healthcare challenges. The success of this project provides a model for similar interventions in other regions, highlighting the potential for technology-driven improvements in global health.

References

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About Innovations in Healthcare

Innovations in Healthcare is a nonprofit organization hosted by Duke University and founded in 2011 by Duke Health, McKinsey & Company, and the World Economic Forum. Our mission is to increase access to quality, affordable healthcare worldwide by scaling leading innovations. We work with over 100 healthcare entrepreneurs in more than 90 countries and provide capacity-building training and consulting to healthcare systems throughout the world. We work closely with our partner, the Duke Global Health Innovation Center, toward our shared vision of a world where innovation improves health for all. By combining academic excellence and global engagement to improve health, we improve access to quality, affordable healthcare worldwide.

About Health Builders

Health Builders strengthens management of health systems and builds health care infrastructure. Health Builders is revolutionizing primary health care in rural Rwanda in three essential areas that increase access and improve the quality of primary health care:

1. Training and Mentoring
2. Technology and Equipment
3. Health Facilities