Digital pen technology for partographs

Country of origin United States of America

Health problem addressed
Obstructed labor is a leading cause of maternal mortality and morbidity in developing countries. This condition can be prevented by early detection using the paper partograph form advocated by the WHO for maternal labor monitoring. Correct use of the partograph is limited however, due to inadequate training, staff shortages, and form complexity.

Product description
This device uses off-the-shelf digital pen hardware and a custom software application that runs on the pen. The digital pen interacts with the paper partograph form by reading a pattern of “microdots” that have been printed on the partograph using a standard laser printer.

Product functionality
The location information encoded in the microdots allow the digital pen to execute specific functionality based on where measurements are plotted on the paper. The system provides real-time data validation using handwriting recognition, time-based and patient-specific reminders, decision support and data interpretation, and audio recordings of the WHO partograph use instructions.

Developer’s claims of product benefits
The benefits of this device are ease of use, minimal training requirements, improved data quality and capture, and seamless integration into current local practice. The local healthcare systems are paper-based, so retaining paper-and-pen avoids the costs of implementing a new technology-based system, training, and promoting user adoption. Functionality of the pen is triggered by regular plotting of partograph data and does not require the user to navigate menus or select features.

Operating steps
Hold down the power button to turn on the digital pen. Audio instructions are accessed by touching the pen to text boxes on the partograph. All other functionality (i.e., reminders, data-validation, and decision-support) are triggered by routine labor monitoring actions and data recordings by nurses and midwives.

Development stage
Two pilot studies will be conducted in June and July 2012 at Kenyatta National Hospital, Pumwani Maternity Hospital, and the University of Nairobi in Kenya. The first pilot will evaluate the pen as an in-class training tool for nursing students, and the second study will evaluate the pen in active labor wards at KNH and Pumwani to determine the impact on partograph completion rates and perceptions of usability and functionality among nurse-midwives.

Future work and challenges
The future challenges for making the pen technology available include: establishing a functional supply chain for international digital pen manufacturing, distribution, and maintenance; expanding the functionality of the digital pen system to other commonly used forms, which may differ in terms of standardization across hospitals and clinics; providing laser printers for paper production and facilitating distribution of printed forms to district hospitals; and adding a connectivity component for transmitting data in order to improve the referral system from primary to tertiary care facilities.

User and environment
User: Physician, nurse, midwife
Training: 1-2 hours
Maintenance: None

Environment of use
Settings: Rural, urban, primary (health post, health center), secondary (general hospital), tertiary (specialists hospital)
Requirements: The infrastructure required includes an intermittent power supply for recharging the pens, and once-monthly access to a personal computer to archive digital patient data off of the digital pens. Future iterations of this project will require asynchronous access to a cellular network.

Product specifications
Retail Price (USD): 100
List price (USD): 100
Other features: Mobile
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