Lessons learned from an evaluation of a decision and performance support tool in international health

An evaluation of the ePartogram

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Roundtable Objective: to share lessons learned from an evaluation process for a new technology to help inform other AEA evaluators working to assess and improve professionals' performance.

Discussion Questions

- Have you been involved with the evaluation of a technology to aid in performance? How so?
- What challenges have you found in developing an evaluation plan for a new technology or intervention that is designed to aid professionals in their performance or when delivering services?
- What are lessons learned or potential solutions?
- What recommendations are for evaluators planning similar program or technology evaluations?

1. Background

Public Health Problem: Globally, in 2015, the World Health Organization (WHO) estimated that 303,000 maternal deaths occurred.[i] Many of these deaths, stillbirths and disabilities could be prevented with timely identification and management of intrapartum complications.[3,4]

Setting and existing technology: In low-resource settings internationally, nurses and midwives serve women giving birth in health facilities. When women are in active stage of labor (from 4 cm to 10 cm dilation of the cervix), maternity providers monitor the progress of labor, the fetal wellbeing and the woman's wellbeing using the pre-printed, paper-based medical record called the partograph.

WHO recommends that the partograph be used to reduce prolonged or obstructed labor, which can result in maternal and fetal deaths, morbidity, and unnecessary operative interventions.[ii] However, routine use of the paper partograph in low- and middle-income countries is low and inconsistent.[iii, 8iv] In many settings, partographs are filled out retrospectively. Many countries, such as Kenya, have a partograph approved by the Ministry of Health. A published realist review by Bedwell et al of 95 studies of the partograph use acknowledged the challenges of the partograph, called a 'complex clinical intervention', and called for not only assessing client outcomes but also the processes of quality of care. [v]

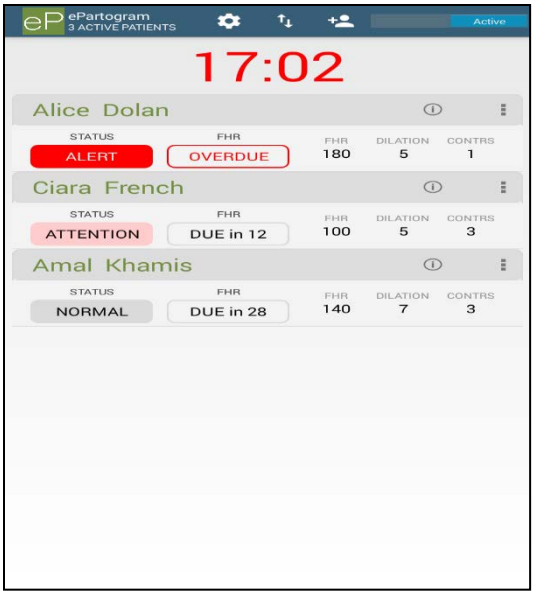
Innovative technology: The novel intervention is Jhpiego's ePartogram ™. The ePartogram is an application on an Android tablet computer that mimics the paper-based partograph but allows only real-time information to be entered. The ePartogram offers decision support to the provider through clinical algorithms developed by Jhpiego based on WHO guidelines. ePartogram allows a supervisor of a clinician to have remote viewing access.

2. What were evaluation research questions?

The aim of the evaluation is to determine whether the clinical care offered to clients is more appropriate and in line with WHO recommendations for care in normally progressing labor and in labor with obstetric complications -- among labors in which the providers used the ePartogram compared to labors in which the providers used the standard paper partograph.

3. What was the study design?

This was a quasi-experimental evaluation with 2 study groups: The intervention group had 6 health facilities across 2 regions in Kenya with health providers using the ePartogram. The control group involved 6 facilities across 2 regions in Kenya with health providers using the standard-of-care paper partograph. Study investigators and local Ministry of Health officials selected the health facility sites; these sites were matched on birth volume and the ability to offer the same level of emergency obstetric care at the start of the study. All maternity providers received labor management training. Intervention-site providers received training and ongoing support with the ePartogram.



4. What are the outcomes of interest?

Outcomes of interest relate to the compliance with globally-recommended, labor monitoring practices and recording on the partograph of the practices performed; decision-making and actions taken to maintain normal labor; detection, decision-making and action to address deviations from normal labor and complications arising during labor.

5. What was the original data collection process?

Prior studies had not evaluated partographs for detailed adherence to WHO standards of care and provider actions taken. We did not find a suitable existing evaluation tool/instrument.

In the original evaluation approach, a maternity provider reviewer (described below) was asked to review each partograph. The reviewer was to record into an electronic form whether the partograph case had recordings for each of the 13 partograph parameters[1] on admission and in the first four hours; whether this was the recommended frequency; and for values outside of the normal range. The next section of the tool asked about whether the labor was normal or whether there were signs of any of 13 defined maternal or newborn complications. Next, the tool asked about any of a list of actions taken.

[1] Fetal heart rate, amniotic fluid, moulding, cervical dilation, head descent, contractions, blood pressure (diastolic and systolic), pulse, temperature, and urine (protein, acetone and volume).

Jhpiego recruited 6 nurses/midwives and doctors in Nairobi, Kenya to carry out the 'partograph *review*' process. These individuals did not work in the facilities where the study was taking place, and had many years of experience. They received training from Jhpiego on how to use the evaluation tool on tablets. The idea was that each maternity provider would be asked to review hundreds of scans of paper partographs or of the ePartogram printed out (pdf files).

6. What were the challenges with the original process?

Maternity providers were answering questions in the partograph review tool according to their judgment and training received. It was found that responses were not applied consistently (reliability) or with accuracy. Extra refresher orientation of the reviewers were held and discussions were held An exercise was instituted to have each of 24 selected partographs reviewed by two maternity providers in the field, and also by a Jhpiego staff expert maternity provider. When comparing the findings of the expert and the two additional clinicians, it was determined that the responses were not standardized or consistent. It was decided to develop a new tool and system that would remove any judgment from the process of obtaining evaluation data.

7. What was the revised data collection process?

The revised process was a 'partograph *extraction*' using a new tool. The data collection became a transcription or extraction process that involves looking at the scan (pdf) and then entering partograph parameter data on every 30 minute period to an electronic database. The questions were more granular, covering the smallest piece of information. Each partograph parameter (fetal heart rate, etc.) recording was captured for every 30 min period up to 12 hour duration. The extractor entered each of the 13 parameters. If there was no recording or a recording was left blank by the clinical provider, the extractor entered this as 'data not recorded'. In addition, the information at the top and bottom of the partograph on the mother's and baby's overall health was entered into our database. The clinical actions taken by the provider, added to the partograph by the study, were also entered to our database.

This is a large data extraction exercise. Four public health graduate student interns were trained as data extractors. The extractors took about 20-40 minutes to enter all data that they saw on a partograph scan to the REDCap database on a lap top.

The original sample size was 2,200 partographs (1,100 in each study group). An additional 5 student interns were hired in October 2017 to help complete data entry.

8. What are the efforts at data quality?

A reliability exercise was carried out for a random sample of 300 of the 2200 partographs (150 randomly selected study ids of ePartogram scans and paper partograph scans each).

a. When the extractor enters all information on a case into the REDCap database, the extractor keeps a log indicating any difficulties or challenges that may affect the data and communicates this weekly to the coordinator.
b. In REDcap, we can compare the entries of two interns who are assigned to enter the same case. All entries on the first 30-minute period and overall case information is compared. Discrepancies are recorded back to the interns and tips are shared to the whole team, thus improving data quality. Many of the issues were around mistyping some entries. Recording of dates and times were a few times mistyped, and reading handwriting of the maternity providers was sometimes challenging.

c. As we go back to the partograph scans, Jhpiego staff occasionally ask maternity providers to make a determination on accuracy of the extractors' entries.
d. Data are uploaded to a statistical software, Stata. In Stata we can compare the entries of two interns who entered the same case, or the 'duplicates', by using the Cohen's Kappa statistic on variables of interest beyond the first 30-minute time period of care. This information allows for corrections to some variables. We send tips back to the interns to improve data quality.

9. What are the pros and cons of this approach?

- The advantage of the new approach is that we can receive granular information from the partographs into the database that can be used for analyses. Also, confidence in the validity and reliability is increased in that some mistyping errors are found and corrected, and this allows us to give advice to all data entry interns to improve their entries.
- The disadvantage is the approach is labor intensive and time consuming. There is a possibility of fatigue in data entry. There is less opportunity to ask questions of the facility providers.
- Extractors are asked to extract data exactly as is, without making interpretations. This isboth advantageous and difficult since sometimes the original clinician made a writing mistake, such as by writing a wrong day/month/year for date of client admission.

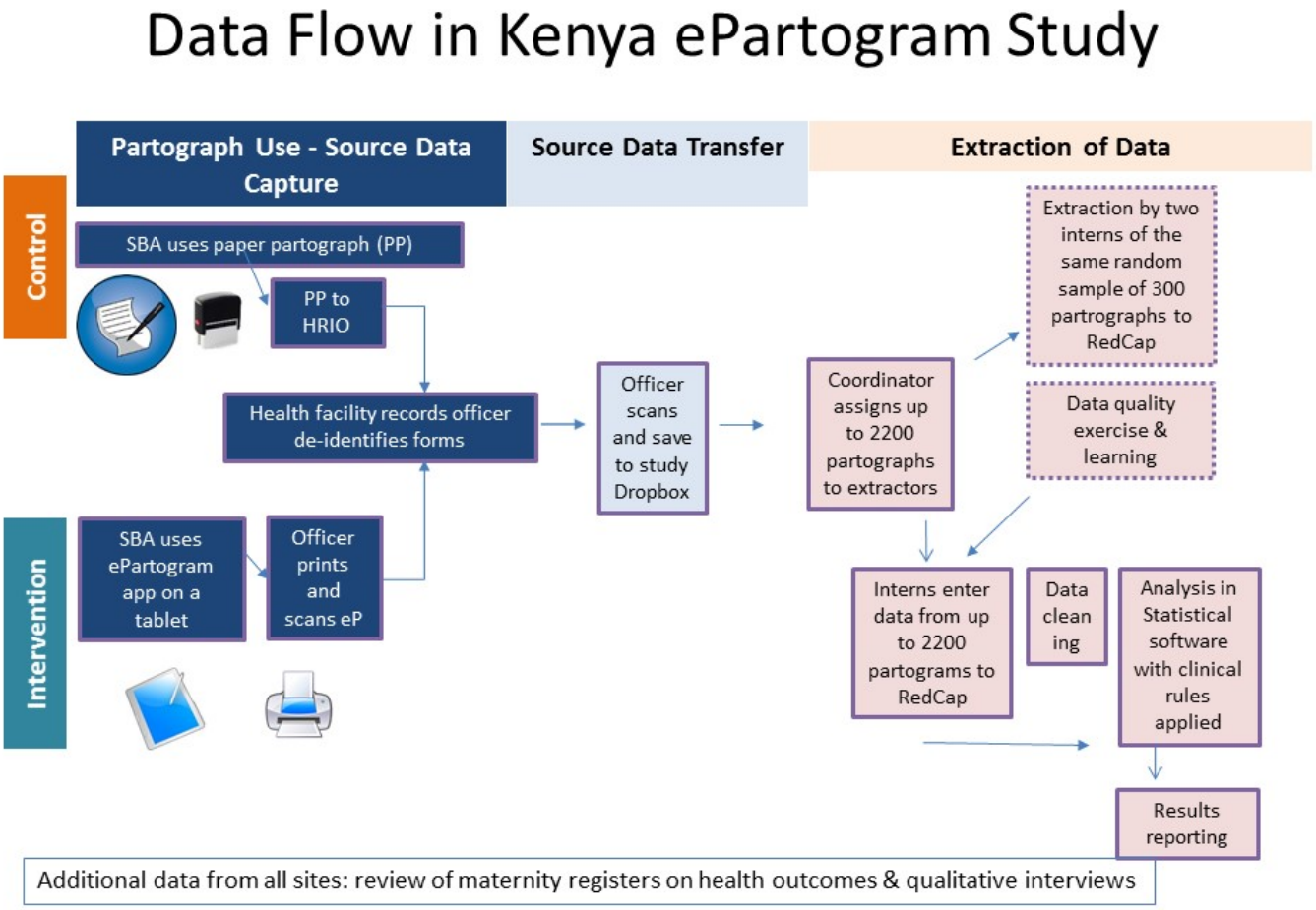
10. What are planned analyses?

The analysis will first cover the frequency of providers' compliance with WHO recommendations for reporting clinical measurements on the partograph for normal labor and for cases that deviate from normal labor. Next, for labors that are normal, the actions taken by the provider to maintain normal labor using Jhpiego's clinical rules will be assessed for appropriateness. Lastly, the actions taken by the provider in cases where some obstetric complications may have arisen will be assessed according to Jhpiego's clinical rules.

Results will be compared between the two study groups in a bivariate analysis between the ePartogram group and the paper partograph group. A final multivariate analysis will adjust for potential confounders and account for clustering (correlation of measurements) in the provider or the facility.

11. <u>What are lessons learned? Main Take-Aways</u>

- Data from a review of a record of technology should be available at the granular level in the electronic form for further data analysis.
- From the beginning, it is good to anticipate the building of an evaluation database into the back-end of the software app decision-support tool for providers.
- Data quality and ensuring accuracy (validity) and consistency (reliability) of data is a process that can be planned for in evaluations.



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