

Heather Underwood
PhD Candidate, ATLAS Institute
University of Colorado Boulder
heather.underwood@colorado.edu

Dr. John Ong'ech

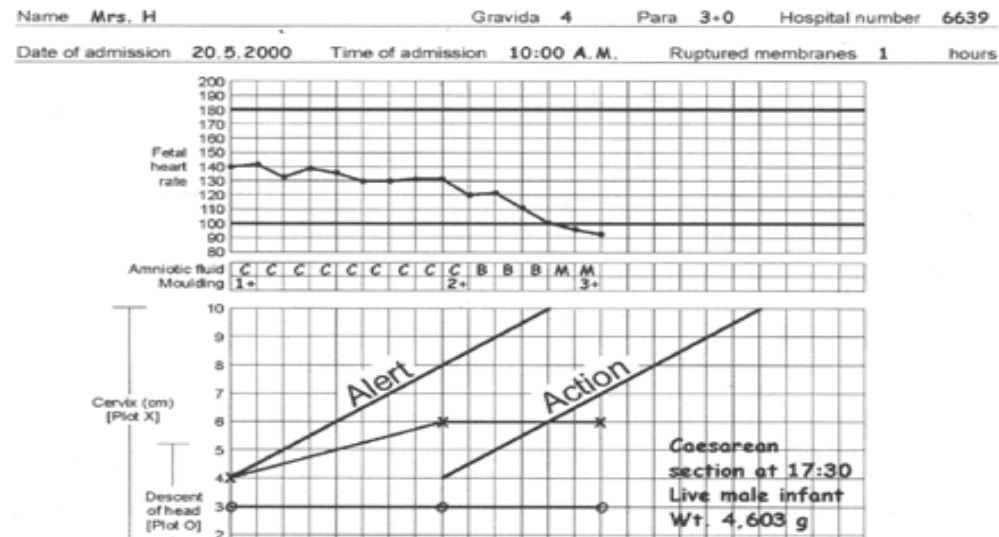
Assistant Director and Head of Reproductive Health Department
Kenya National Hospital
jongech@yahoo.com

The PartoPen in Training and Clinical Use Two Preliminary Studies in Kenya

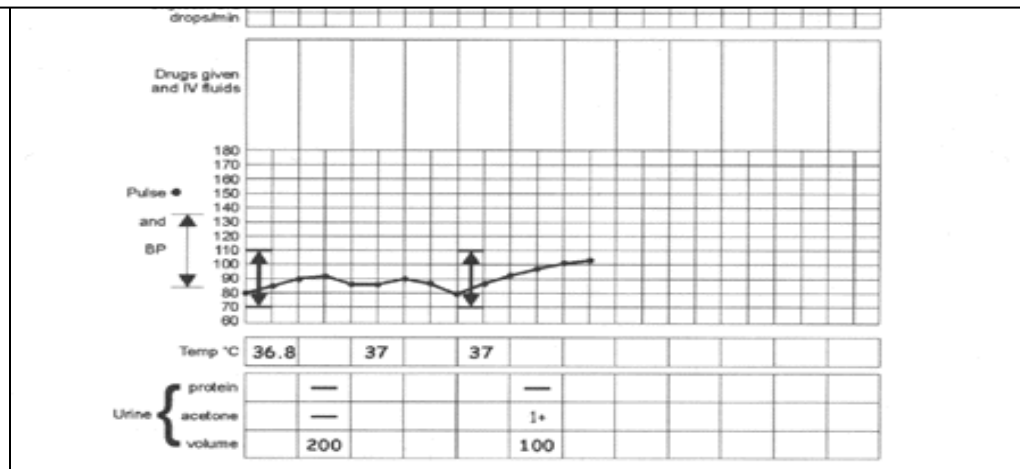
**MNH TWG Meeting
27 June 2013**

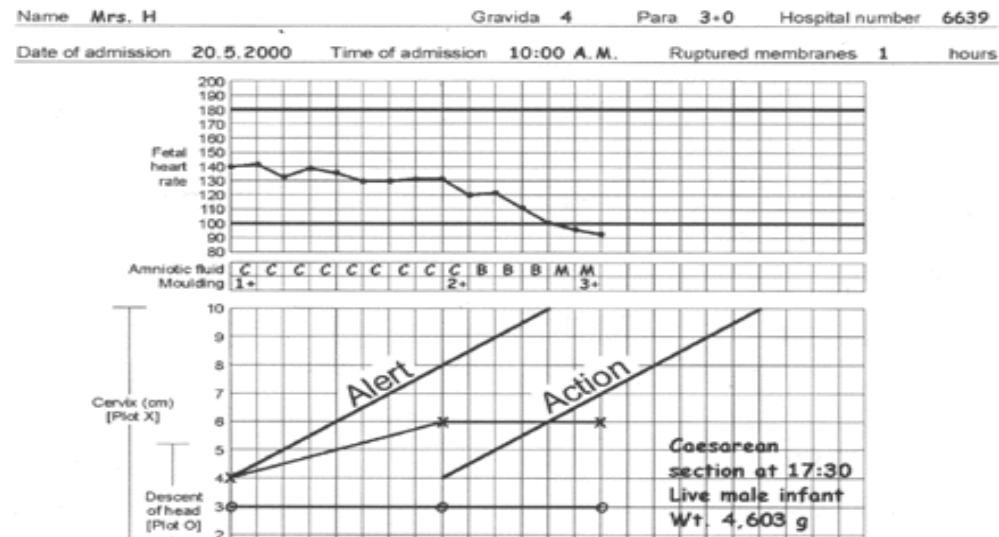
“In 2010, **287,000** women died during and following pregnancy and childbirth. Almost all of these deaths occurred in **low-resource settings**, and most **could have been prevented**.” –World Health Organization, 2012

“In Kenya, maternal mortality remains high at **488** maternal deaths per 100,000 live births.” –World Health Organization, 2012

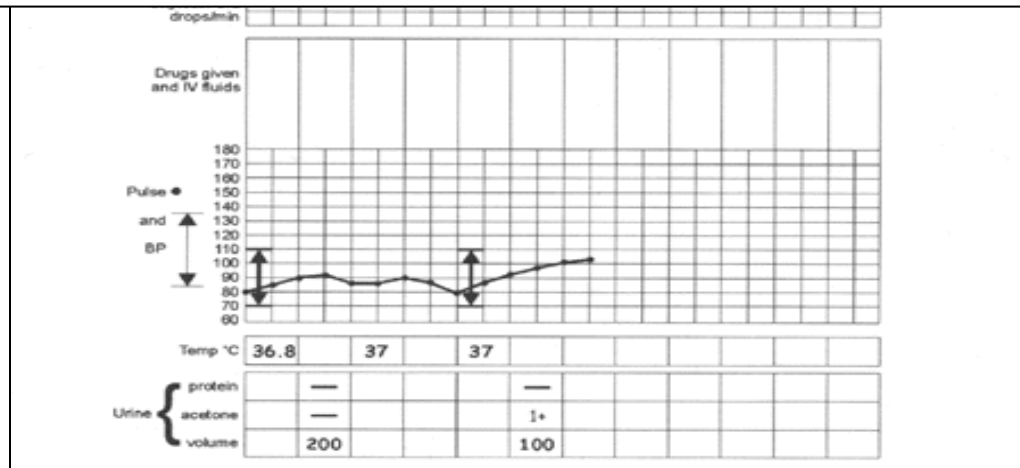


Correct partograph use **reduces obstructed labor**, and subsequently, stillbirths and maternal deaths. (WHO, 1994)





88.2% of the evaluated patient records contained a partograph, only **23.8%** of the forms had been used correctly. (Lavender et al. 2011)



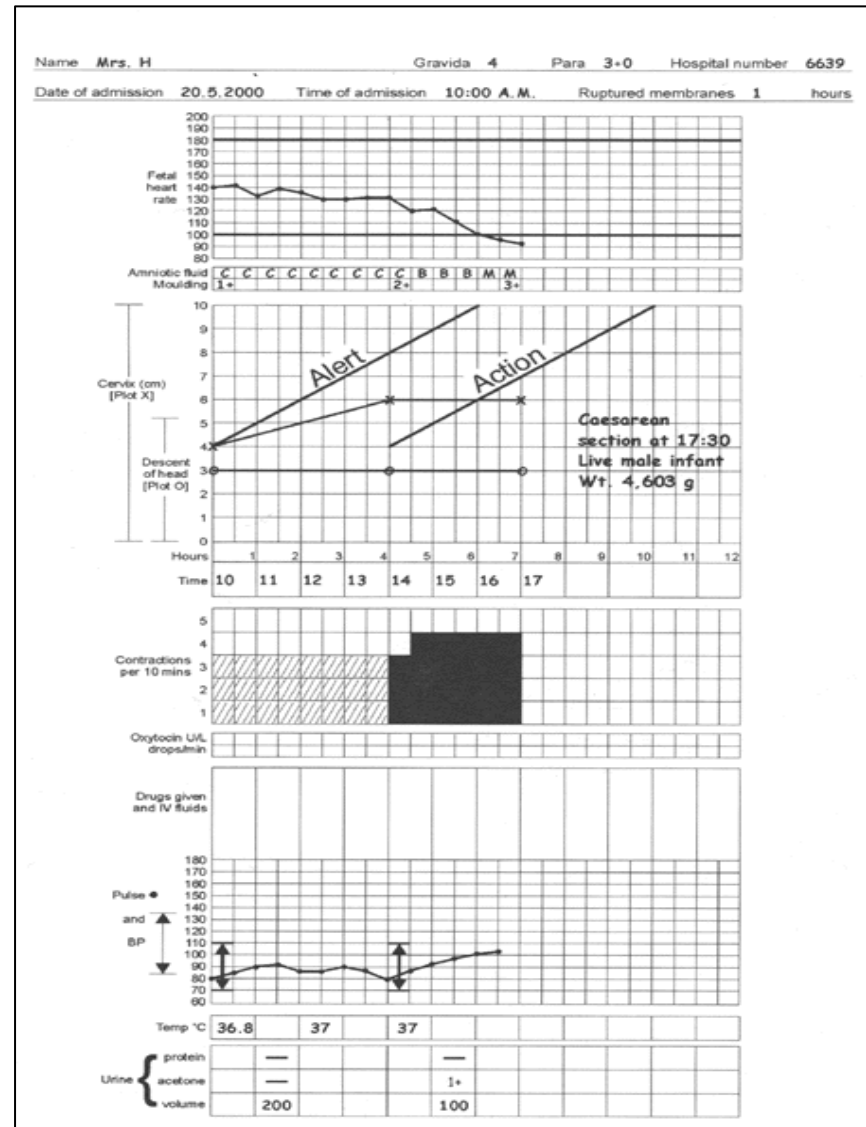
Barriers?

Understaffed

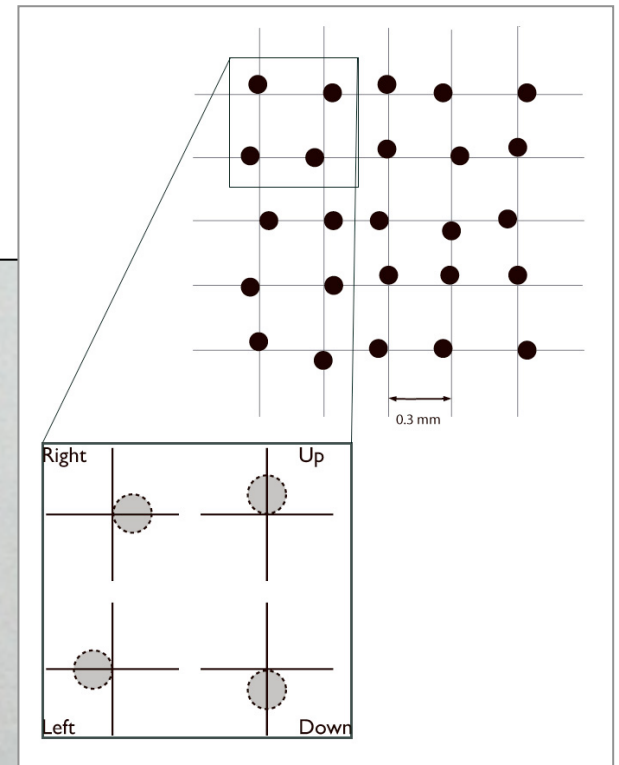
Inadequate Training

Data interpretation

Form Complexity



PartoPen



PartoPen Features

- Use instructions
- Decision support
- Reminders
 - Reminder IDs

Two pilot studies were conducted in June – August 2012 in nursing classrooms and labor wards. The research question was the following:

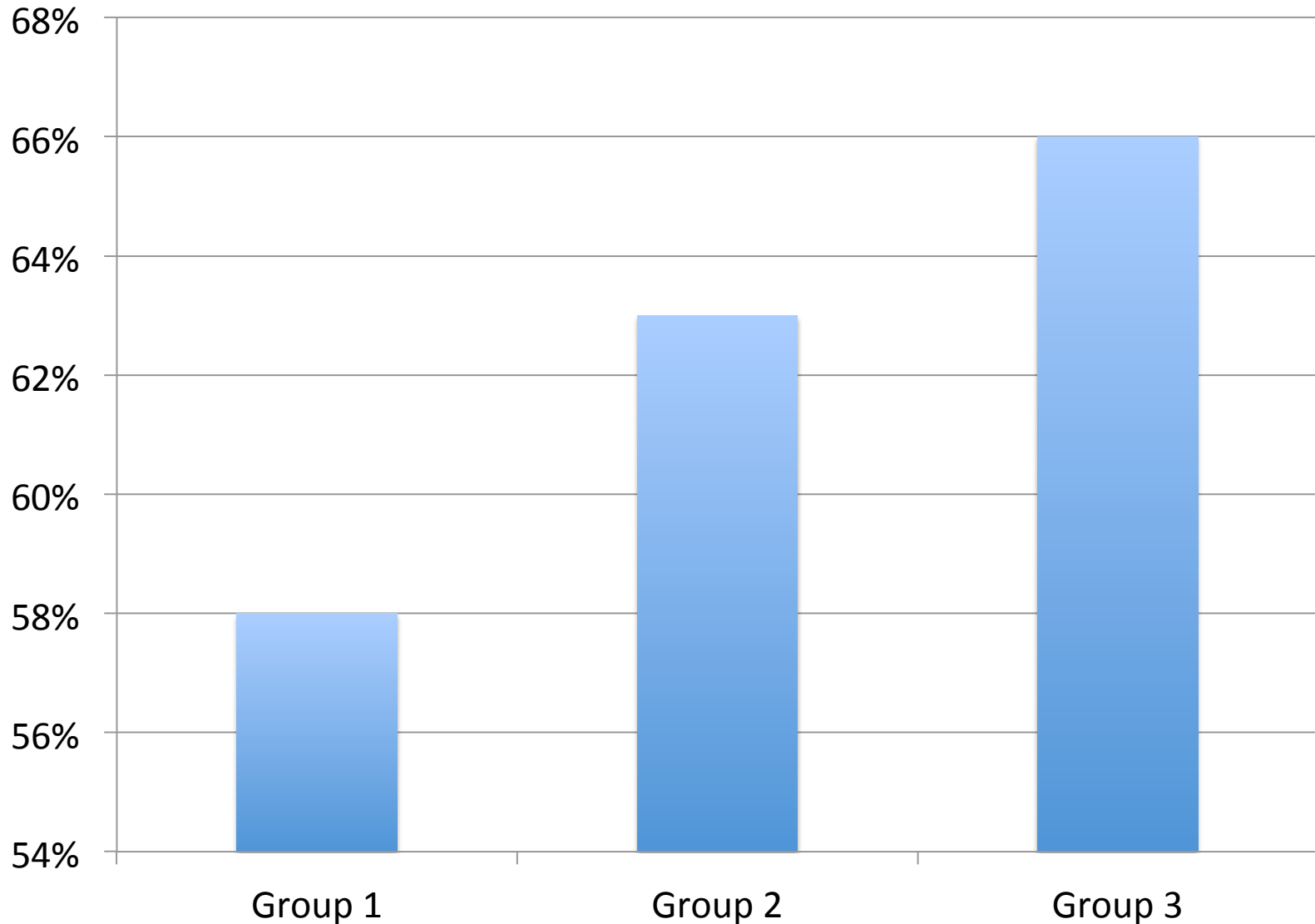
**How does the PartoPen affect
partograph completion and
data quality?**

1. In Nursing Classrooms

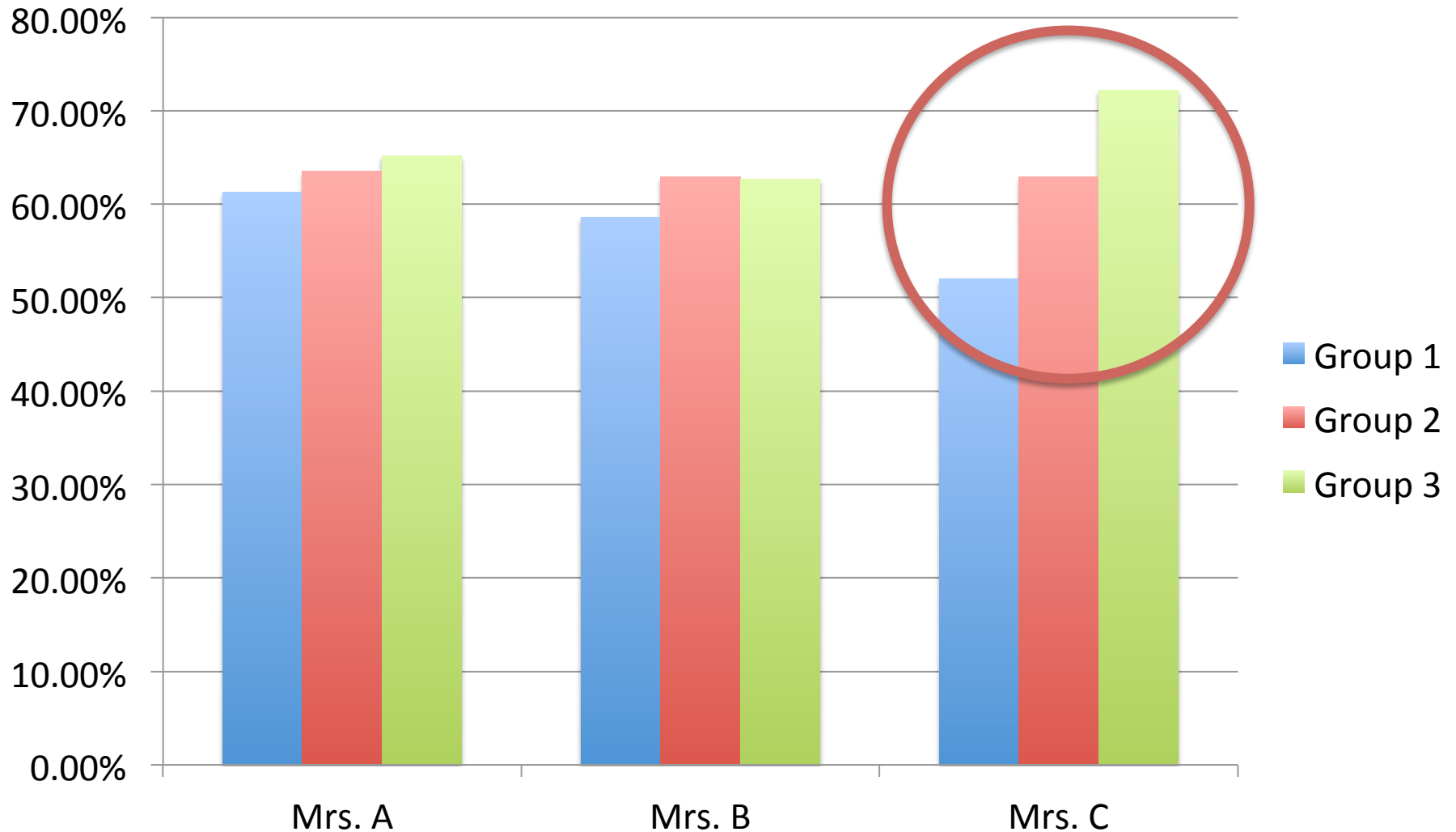
Underwood, H., Ong'ech, J. et al. 2012. The PartoPen in Training and Clinical Use: Two Preliminary Studies in Kenya. *Proc. 6th Int'l Conference on Health Informatics, 2013.*

- 3 groups
 - Silent logging pen
 - PartoPen with no instruction
 - PartoPen with 15 minute instruction and demo
- 2 of 3 possible case studies
 - Mrs. A: Normal labor
 - Mrs. B: Prolonged labor
 - Mrs. C: Prolonged labor with cesarean section

4th Year Student Worksheet Scores



Average Worksheet Scores for Year 4 Students by Case Study

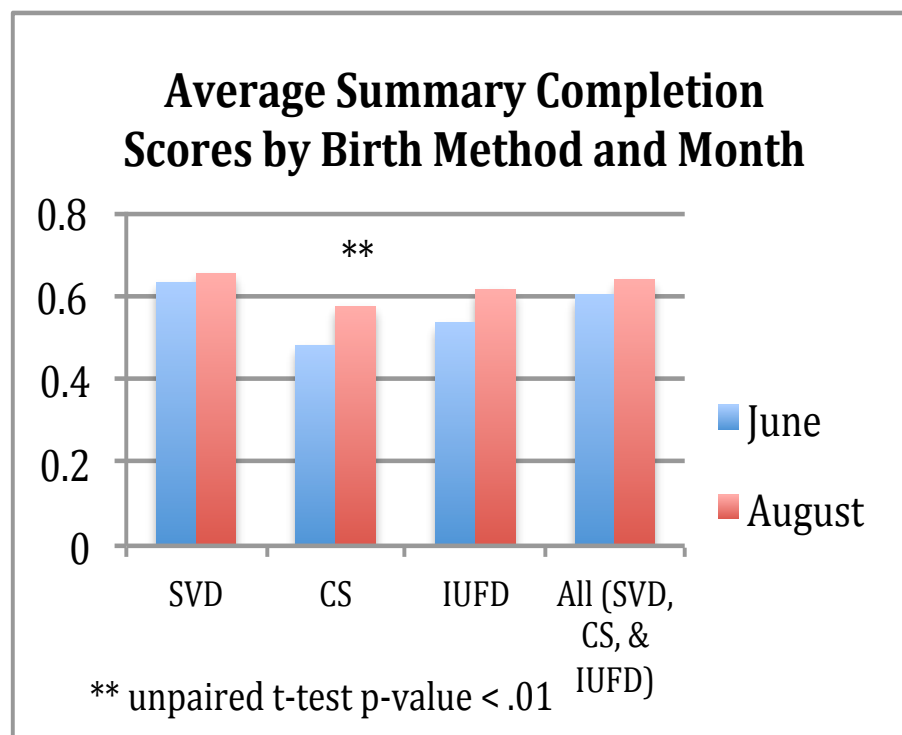


2. In Labor Wards

Underwood, H., Ong'ech, J., Sterling, S.R., Bennett, J. 2013. The PartoPen in Practice: Evaluating the Impact of Digital Pen Technology on Maternal Health in Kenya. *Submitted to ICTD2013.*

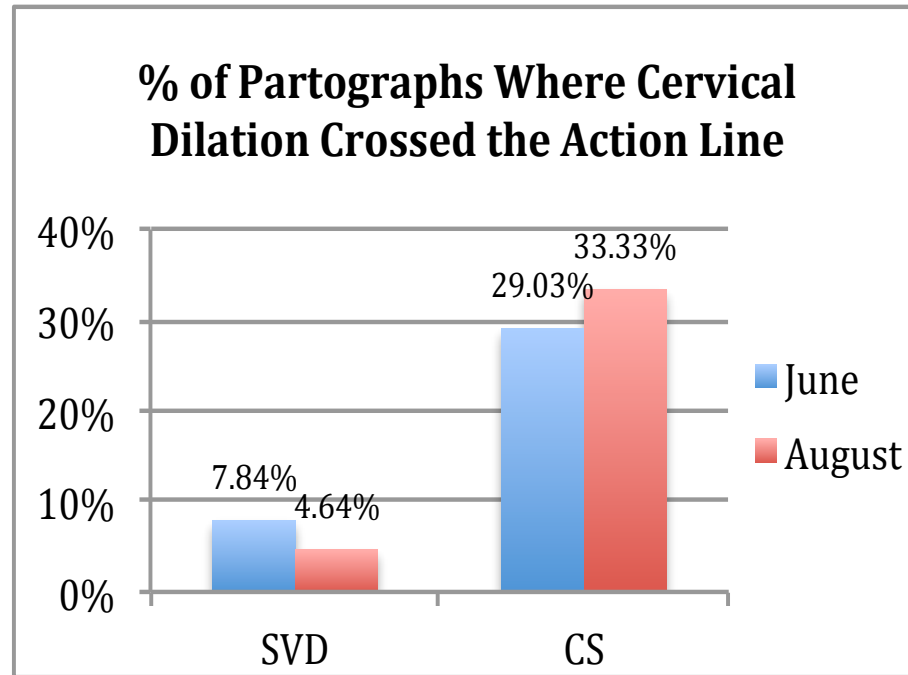
- 2 study sites
 - Kenyatta National Hospital
 - Pumwani Maternity Hospital (data insufficient)
- 50 KNH nurses
- 2 month study, 851 partographs from KNH
 - 358 before PartoPen intervention
 - 493 filled out with the PartoPen

Impact on Completion



Average partograph completion scores for the summary section of the form by spontaneous vaginal delivery (SVD), cesarean section (CS), and intrauterine fetal death (IUFD). Improved completion rates occurred for all birth method categories, with a significant difference occurring for CS cases.

Impact on Decision Making



Percentage of partographs that had a cervical dilation measurement plotted across the action line by spontaneous vaginal delivery (SVD) and cesarean section (CS). There were fewer SVD cases with a measurement across the action line in August, and more CS cases with a measurement across the action line in August.

On the surveys, nurses reported improvement in the following areas:

25% increase in completion

9 out of 10 for usability

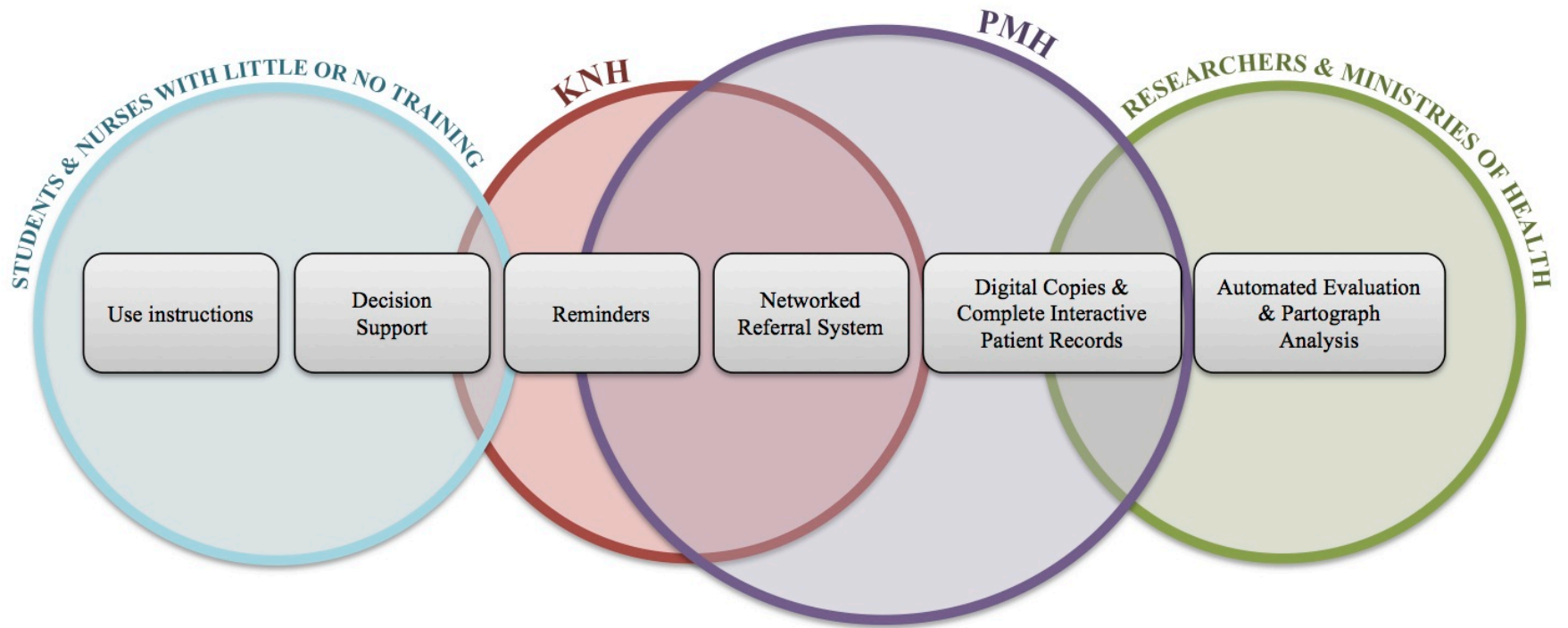
9.2 out of 10 for usefulness

June 2013 - Update

- PartoPens successfully used at KNH for 9 months after initial deployment
- Over 600 partographs completed with the PartoPens
- All of the PartoPens were accounted for and were functional – PartoPens showed robustness in the hospital environment

Noted Issues

- **Printing** – Delays in ordering toner and replacement parts; local unavailability of printer components
- **Nurse to Patient Ratio** – Surveys indicate that nurses are highly-trained in partograph, but high patient loads prevent full and correct completion



Cost Breakdown

- \$100 per pen
- 1 pen per nurse
- 5 shifts per week (8 hours)
- 5 patients (in labor) per shift
- Conservative pen lifespan = 2 years
- $2 \text{ years} * 52 \text{ weeks/yr} * 5 \text{ shifts/week} * 5 \text{ patients/shift} = 5000 \text{ patients}$ seen by one nurse (i.e., one pen) in 2 years
- Thus $\$100/5000 \text{ patients} = \$0.02 \text{ per patient cost}$

Digital Pens & Healthcare

- Integration with EMRs
- CDSS implementation
- Reduce transcription & medical errors

Next Steps...

- Outcomes Research
- Rural & Referral
- Data Collection
- **Partnerships**



BILL & MELINDA
GATES foundation



Heather Underwood

PhD Candidate, ATLAS Institute
University of Colorado Boulder
heather.underwood@colorado.edu

Dr. John Ong'ech

Assistant Director and Head of Reproductive Health Department
Kenyatta National Hospital
jongech@yahoo.com

Acknowledgements

Kenyatta National Hospital, Pumwani & the University of Nairobi

Zahida Qureshi, Philomena Owende, Omondi Kumba, Grace Omoni, Sabina Wakasiaka

University of Colorado Boulder

John K. Bennett & S. Revi Sterling, Maya Appley, Sara Rosenblum, Addie Crawley