Virika Hospital Maternal and Neonatal Data: a Partnership with the University of Michigan

Priscilla Busingye
Joseph Kolars
Candace Kolars
Cheryl Moyer

June 17, 2017 Fort Portal

Outline

- Background on the collaboration
- Methodology (Papers 1 & 2)
- Results: Paper 1
- Results: Paper 2
- Paper 3
- Summary

Background on the Collaboration

- Dr. Joseph Kolars falls under the spell of Sister Priscilla Busingye
- In 2012, Dr. Kolars borrowed the maternity log book, carrying it back to Michigan in a suitcase
- I do research on maternal and neonatal health… and I was very interested in helping Virika learn from the data collected.

Methods

- In Michigan, a research assistant went through every line of the log book, transferring it into an Excel spreadsheet
- Candace Kolars and I worked with Sister Priscilla to clarify confusing data, standardize abbreviations, and understand what each column and response option meant
- We planned potentially three papers, of which two have come to fruition (the third paper we will talk about today is from a different source)

Methods (con't)

- **Paper 1: An exploration of overall outcomes in the years since an OB/GYN came to Virika Hospital**
  - Rationale:
    - Lots of global interest in the role of OB/GYNs as a mechanism to improve maternal and neonatal outcomes;
    - Recent paper had suggested OB/GYNs had important public health benefits but the paper included NO outcomes data
- We compared 2009, 2010, and 2011 data on maternal and neonatal indicators to illustrate changes over time

Methods (con't)

- **Paper 2: A closer look at neonatal outcomes, comparing factors associated with stillbirths and neonatal deaths before discharge compared to live births**
  - Rationale: Rare to have a dataset from rural Africa with 5000+ births that also includes demographic factors
- Compared the factors associated with stillbirths (compared to live births) and neonatal deaths (compared to live births) to determine the factors most strongly associated with each, including distance the women traveled

Methods (con't)

- **For both papers:**
- **Data were imported into Stata V13.0** (data analysis software package)
- **Frequencies and descriptive statistics were calculated** (e.g. what percent of patients had various characteristics, what was the mean number of things such as age, previous deliveries, etc.)
- **"Multivariate" models were run that put several of the most important variables together to see what happened when we accounted for all of them together** (e.g. Is maternal age or a baby's gestational age a more important predictor of outcomes? What about when we look at them together? "Multivariate models" try to account for such things)

Results – Paper 1

www.figo.org

Contents lists available at ScienceDirect

International Journal of Gynecology and Obstetrics

journal homepage: www.elsevier.com/locate/ijgo

BRIEF COMMUNICATION

Three years of data on the impact of obstetrician/gynecologist coverage in rural Uganda

Cheryl A. Moyer [a,*], Candace K. Kolars [b], Priscilla Busingye [c]

[a] Global REACH and Department of Medical Education, University of Michigan Medical School, Ann Arbor, MI, USA
[b] Office of Performance Assessment and Clinical Effectiveness, University of Michigan Health System, Ann Arbor, MI, USA
[c] Department of Obstetrics and Gynecology, Virika Hospital, Fort Portal, Uganda

Results – Paper 1

- **6000+ deliveries were recorded… with a trend toward more each year** (even though 2010 had more births than 2011, both were higher than 2009…)
- **The percent of women getting a cesarean section dropped slightly from 2009 – 2011 (30.2% of births in 2009 were by c-section, compared to 28.4% in 2011)**
- **The percent 'undocumented' dropped as well – kudos to staff for keeping excellent records!**

	2009 number (% of deliveries)	2010 number (% of deliveries)	2011 number (% of deliveries)
Total deliveries	1882	2140	2077
Vaginal	1096 (58.2)	1385 (64.7)	1401 (67.5)
Cesarean	568 (30.2)	625 (29.2)	589 (28.4)
Undocumented	218 (11.6)	30 (1.4)	87 (4.2)

Results – Paper 1 (con't)

	2009 number (% of deliveries)	2010 number (% of deliveries)	2011 number (% of deliveries)
Number of referrals	406 (21.6)	364 (17.0)	457 (22.0)
Number of live births	1707 (90.7)	1986 (92.8)	1930 (93.0)
Number of stillbirths	175 (9.3)	154 (7.2)	147 (7.0)
"Fresh" (% of SBs)	82 (46.9)	101 (65.6)	91 (61.9)
"Macerated" (% of SBs)	86 (49.1)	53 (34.4)	56 (38.1)
Unclassified (% of SBs)	7 (0.4)	0	0
Early neonatal deaths	4 (2.1 per 1000)	3 (1.4 per 1000)	27 (13.0 per 1000)
Maternal deaths	15 (80 per 10000)	4 (19 per 10000)	8 (39 per 10000)

Results – Paper 1 (con't)

	2009 number (% of deliveries)	2010 number (% of deliveries)	2011 number (% of deliveries)
Number of referrals	406 (21.6)	364 (17.0)	457 (22.0)
Number of live births	1707 (90.7)	1986 (92.8)	1930 (93.0)
Number of stillbirths	175 (9.3)	154 (7.2)	147 (7.0)
"Fresh" (% of SBs)	82 (46.9)	101 (65.6)	91 (61.9)
"Macerated" (% of SBs)	86 (49.1)	53 (34.4)	56 (38.1)
Unclassified (% of SBs)	7 (0.4)	0	0
Early neonatal deaths	4 (2.1 per 1000)	3 (1.4 per 1000)	27 (13.0 per 1000)
Maternal deaths	15 (80 per 10000)	4 (19 per 10000)	8 (39 per 10000)

Results – Paper 1 (con't)

	2009 number (% of deliveries)	2010 number (% of deliveries)	2011 number (% of deliveries)
Number of referrals	406 (21.6)	364 (17.0)	457 (22.0)
Number of live births	1707 (90.7)	1986 (92.8)	1930 (93.0)
Number of stillbirths	175 (9.3)	154 (7.2)	147 (7.0)
"Fresh" (% of SBs)	82 (46.9)	101 (65.6)	91 (61.9)
"Macerated" (% of SBs)	86 (49.1)	53 (34.4)	56 (38.1)
Unclassified (% of SBs)	7 (0.4)	0	0
Early neonatal deaths	4 (2.1 per 1000)	3 (1.4 per 1000)	27 (13.0 per 1000)
Maternal deaths	15 (80 per 10000)	4 (19 per 10000)	8 (39 per 10000)

Results – Paper 1 (con't)

	2009 number (% of deliveries)	2010 number (% of deliveries)	2011 number (% of deliveries)
Number of referrals	406 (21.6)	364 (17.0)	457 (22.0)
Number of live births	1707 (90.7)	1986 (92.8)	1930 (93.0)
Number of stillbirths	175 (9.3)	154 (7.2)	147 (7.0)
"Fresh" (% of SBs)	82 (46.9)	101 (65.6)	91 (61.9)
"Macerated" (% of SBs)	86 (49.1)	53 (34.4)	56 (38.1)
Unclassified (% of SBs)	7 (0.4)	0	0
Early neonatal deaths	4 (2.1 per 1000)	3 (1.4 per 1000)	27 (13.0 per 1000)
Maternal deaths	15 (80 per 10000)	4 (19 per 10000)	8 (39 per 10000)

Results – Paper 1 (con't)

	2009 number (% of deliveries)	2010 number (% of deliveries)	2011 number (% of deliveries)
Number of referrals	406 (21.6)	364 (17.0)	457 (22.0)
Number of live births	1707 (90.7)	1986 (92.8)	1930 (93.0)
Number of stillbirths	175 (9.3)	154 (7.2)	147 (7.0)
"Fresh" (% of SBs)	82 (46.9)	101 (65.6)	91 (61.9)
"Macerated" (% of SBs)	86 (49.1)	53 (34.4)	56 (38.1)
Unclassified (% of SBs)	7 (0.4)	0	0
Early neonatal deaths	4 (2.1 per 1000)	3 (1.4 per 1000)	27 (13.0 per 1000)
Maternal deaths	15 (80 per 10000)	4 (19 per 10000)	8 (39 per 10000)

Results – Paper 1 (con't)

	2009 number (% of deliveries)	2010 number (% of deliveries)	2011 number (% of deliveries)
Number of referrals	406 (21.6)	364 (17.0)	457 (22.0)
Number of live births	1707 (90.7)	1986 (92.8)	1930 (93.0)
Number of stillbirths	175 (9.3)	154 (7.2)	147 (7.0)
"Fresh" (% of SBs)	82 (46.9)	101 (65.6)	91 (61.9)
"Macerated" (% of SBs)	86 (49.1)	53 (34.4)	56 (38.1)
Unclassified (% of SBs)	7 (0.4)	0	0
Early neonatal deaths	4 (2.1 per 1000)	3 (1.4 per 1000)	27 (13.0 per 1000)
Maternal deaths	15 (80 per 10000)	4 (19 per 10000)	8 (39 per 10000)

Results – Paper 1 (con't)

- We also see that the number and percent of babies with low birthweight have dropped
- HIV+ mothers are more likely to be on HAART

	2009 number (% of deliveries)	2010 number (% of deliveries)	2011 number (% of deliveries)
Babies born <2.5 kg	216 (11.5)	119 (5.6)	91(4.4)
Babies born with asphyxia	132 (7.0)	231 (10.8)	142 (6.8)
Number of HIV+ deliveries	169 (9.0)	206 (9.6)	199 (9.6)
HIV+ mothers on HAART	27 (16.0)	51 (35.9)	60 (56.1)

Summary – Paper 1

- These data suggest positive trends in both maternal and neonatal outcomes
- These data don't tell us "WHY", but we can guess:
  - Presence of onsite OB/GYN
  - Improved access to emergency obstetric care
  - Strong staff support
  - Improved antenatal care provision
  - Word gets out, women trust the facility
- This paper lays the foundation for further research at Virika

Results – Paper 2

International Journal of Gynecology and Obstetrics 134 (2016) 190–193

Contents lists available at ScienceDirect

International Journal of Gynecology and Obstetrics

journal homepage: www.elsevier.com/locate/ijgo

www.figo.org

CLINICAL ARTICLE

Predictors of stillbirths and neonatal deaths in rural western Uganda

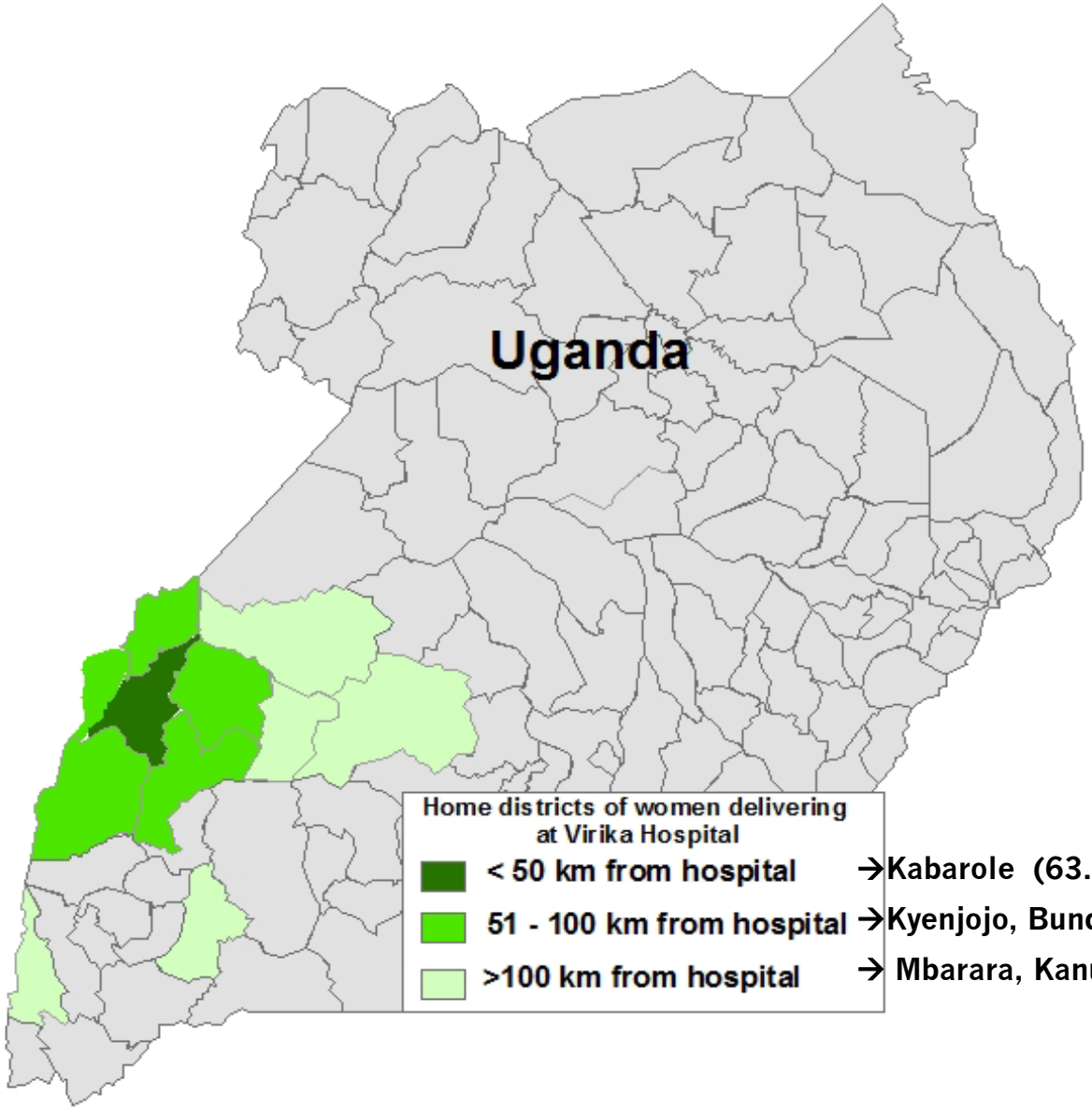
Cheryl A. Moyer [a,*], Candace K. Kolars [b], Samuel A. Oppong [c], Ashura Bakari [d], April Bell [e], Priscilla Busingye [f]

[a] Global REACH and Departments of Learning Health Sciences and Obstetrics and Gynecology, University of Michigan Medical School, Ann Arbor, MI, USA
[b] Office of Performance Assessment and Clinical Effectiveness, University of Michigan Health System, Ann Arbor, MI, USA
[c] Department of Obstetrics and Gynecology, Korle Bu Teaching Hospital, Accra, Ghana
[d] Ghana Health Service, Kumasi, Ghana
[e] School of Public Health, University of Michigan, Ann Arbor, MI, USA
[f] Department of Obstetrics and Gynecology, Virika Hospital, Fort Portal, Uganda

Results – Paper 2

- 4,883 births were recorded with enough information to include in the analysis
- Mothers averaged 25.7 years old
- Nearly 2/3 of mothers had 5+ previous births
- More than 1/3 of mothers came from >50km away

Results – Paper 2 (con't)



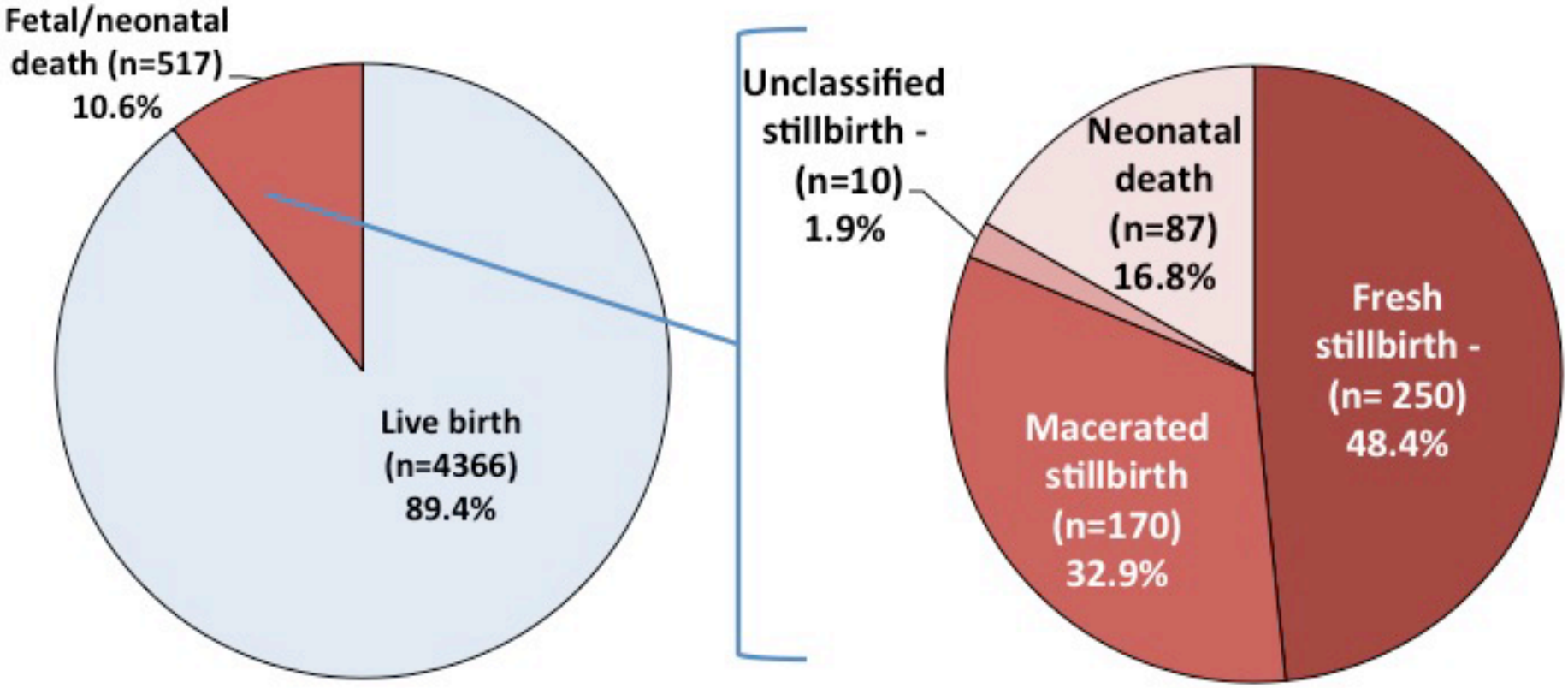
→Kabarole (63.9% of women)

→Kyenjojo, Bundibugyo, Ntoroko, Kamwenge, Kasese (34.4%)

→ Mbarara, Kanungu, Mubende, Kyegegwa, Kibaale (1.7%)

Results – Paper 2 (cont)

Overall, 89.4% of babies survived until discharge. This graph shows what happened to the 517 who did not.



Results – Paper 2 (con't)

- Looking at each variable separately, the factors most strongly associated with stillbirth (compared to a live birth) were:
  - older maternal age
  - higher parity
  - lower infant gestational age
  - lower birthweight
  - a history of obstetric risk factors
  - maternal delivery complications
  - mother being HIV positive
  - mother not receiving any antenatal care, and
  - hospital being 50+km away from the mother's home.

Results – Paper 2 (con't)

- Looking at each variable separately, the factors most strongly associated with neonatal deaths (compared to a live birth) were:
  - lower gestational age at birth
  - lower birthweight
  - male gender
  - maternal delivery complications
  - infant complications
  - mother being HIV positive
  - mother not receiving any antenatal care, and
  - the hospital being 50-100km away from home.

Results – Paper 2 (con't)

- As expected, maternal age and parity were significantly correlated. (As age increases, so does parity.) Since we can't have two highly correlated variables in the same model, we chose parity for the multivariate models.
- As expected, gestational age and birthweight were significantly correlated. (As gestational age increases, so does birthweight.) Since we can't have two highly correlated variables in the same model, we chose gestational age for the multivariate models.

Results – Paper 2 (con't)

- **In a multivariate model (one that includes many variables), the risk of stillbirth (compared to a live birth) is highest for:**
  - **Women with higher parity, who have any obstetric risk factors, who experience any delivery complications, and who live 51-100km away from the hospital (lower gestational age is also associated with stillbirth, not surprisingly)**
  - *Maternal delivery complications make a woman 3.3 times more likely to have a stillbirth than a woman without delivery complications*
  - *Living 51-100km from the hospital makes a woman 3.4 times more likely to have a stillbirth than a woman who lives within 50km*

Results – Paper 2 (con't)

- **In a multivariate model, the risk of <u>neonatal death</u> (compared to a live birth) is highest for:**
  - **Babies of lower gestational age, those who experienced neonatal complications, and babies born to women who experience any delivery complications**
  - *<u>Maternal delivery complications</u> make a newborn 3.2 times more likely die before discharge than newborns born to mothers without delivery complications*
  - *<u>Neonatal complications</u> make a baby 5.8 times more likely to die before discharge than babies who did not experience such complications*

<u>Maternal delivery complications</u>: e.g. PROM, hemorrhage, uterine rupture, eclampsia, etc.

<u>Neonatal complications</u>: e.g. fetal distress, cord wrapped around the baby's neck, birth asphyxia, birth defects

<u>Obstetric risk factors</u>: e.g. previous c-section, grand multipara, hx of preeclampsia, etc.

Conclusions: Papers 1 & 2

- These findings may not be surprising: we know that complications and distance to facility are important challenges
- Our findings re-emphasize the need to identify and manage pregnancy, delivery, and neonatal complications in a timely manner
- These data are limited to what we see in the hospital, and future data that follows women in the weeks after delivery would help us understand the long term impact of the care women and their babies receive at Virika

Paper 3: Birth Injuries

- University of Michigan Medical Student came to Virika last summer (Jenn Angell) to interview women at a fistula camp
- Traced the cases of 10 women with birth injuries
- "Root causes and social consequences of birth injuries in western Uganda" International Journal of Obstetrics & Gynecology. 2017. In press.

Paper 3 (con't)

- Root cause analysis → Upstream causes of birth injuries:
  - Preference for traditional providers
  - Lack of autonomy
  - Lack of transportation
  - Lack of clarity on labor presentation
  - Referral/access challenges
  - Lack of recognition / discussion of birth injury

Paper 3 (con't)

- Social consequences of birth injury
  - Not allowed to prepare food (woman perceived as ''unclean'')
  - Interferes with work (''I do not bring food to the market anymore'' for fear of leaking in public)
  - Social isolation (avoids community gatherings or visiting friends)
  - Limited sexual intercourse
  - Fear of / being left by husband

Conclusions: Paper 3

- While this is a small paper with results that may not be surprising to any of you, it is helpful to document both "upstream" causes and the social consequences for those who are not seeing these injuries regularly like you do
- This opens the door for more detailed research to understand not only how to prevent the injuries themselves but also to help women overcome the consequences

In sum…

- These small studies show how Michigan and Virika Hospital can work together to better understand and address the issues in maternal and neonatal health

- You are generating really important information! (Keeping track matters!!)

Overall Study Implications

- **Women** need education regarding when to seek care
- **Communities** need to understand the importance of early treatment and support women in obtaining it, and
- **Providers** need sufficient resources, training, and ongoing support to be able to provide high-quality care at any hour.

Thank you!