Addressing the knowledge gap that ultrasound brings to rural prenatal clinics

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AAFP Emerging Leaders Institute Scholar
A little background...

- In April 2014, prior to starting residency, I traveled to Uganda with Child Family Health International and learned about barriers in maternal / child health in Uganda.
Uganda Maternal / Child Health Statistics

2011 Uganda Health Assessment:

- Infant mortality rate is 76 / 1,000 live birth (10x the rate as the United States)
- 6% of Ugandan women receive no antenatal care and the majority (68%) of women receive less than the recommended 4 antenatal care visits
- Only 39% of Ugandan women deliver at Health Facilities
- 84% of women receive their antenatal care from midwives
- And the problem is even worse in rural areas...
Rad Impact

- Rad Impact is a nonprofit organization trying to change some of those statistics by increasing access to medical imaging.

- Ultrasound has been shown to:
  - attract women to come to antenatal appointments to see a “video” of their baby.
  - increase detection of prenatal conditions.
  - Increase opportunities for education and encouragement to deliver at health facilities.

These 12 rural clinics received ultrasound machine donations to their prenatal clinics:
Ultrasound training for midwives

- One midwife from each of those 12 clinics came to a 6 week training course in January 2016 to learn how to use ultrasound to make basic obstetric diagnoses.
Pre-Ultrasound Needs Assessment Survey

I emailed a contact at each of 7 initial clinics the following questions:

1. How many pregnant patients does your clinic see on average in 1 month?

2. What prenatal services does your clinic currently provide and where does the funding come from currently to provide those services?

3. What are current barriers that you are aware of that prevent pregnant women coming to the clinic to get prenatal care?
4. For pregnant women who receive prenatal care, at what gestational age do they typically present and on average, how many appointments do they attend prior to delivery?

5. Do you provide HIV testing? If so, how many HIV positive patients do you serve on average in a year and where do the patients get treatment?

6. What prenatal services, if any, do you wish you could provide but are currently not able to?

7. We are hopeful that bringing an ultrasound machine to your clinic will increase the number of pregnant patients that come to be seen. What challenges do you foresee with being able to serve the increased number of patients?
Survey 1 results

5 of the 7 clinic contacts responded to my initial survey

Barriers to Antenatal Care

- Transportation / Distance
- Lack of Ultrasound
- Negative attitude towards antenatal care
- Cultural / Religious beliefs prohibit
- Excessive congestion in clinic
- Poverty
- Wait time for vaccine delivery
- Lack of Knowledge
- Limited Human Resources
- Limited time
- Partner was not supportive
- Lack of Knowledge
Survey 1 results

Additional Prenatal Services Desired

Number of Health Facilities

- Ultrasound: 5
- Additional Laboratory tests: 2
- Medications: 1
- Cervical Cancer Screening: 1
- Vaccine Fridge: 1
- Building Renovation: 1
Survey 1 results

Anticipated Needs with New Ultrasound Machine

Number of Health Facilities

- Human resources: 4
- Increased Cost: 2
- Infrastructure: 2
- Power supply: 1
- HIV kits: 1
5 additional clinics and midwives were selected by Rad Impact to receive ultrasound machines and training.

6 week training course started in early January.

Survey 2 was administered to each of the 12 midwives on the first day of their training.

The survey was printed and responses scanned and sent back electronically. Response rate was 100%.
Assessment of Knowledge of Management of Diagnoses Made with Ultrasound

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Comfort level in managing a patient if this diagnosis was made in an antenatal clinic (please check one)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not at all comfortable</td>
</tr>
<tr>
<td>Placenta Previa</td>
<td></td>
</tr>
<tr>
<td>Placenta Accreta</td>
<td>✓</td>
</tr>
<tr>
<td>Vasa Previa</td>
<td></td>
</tr>
<tr>
<td>Breech Presentation</td>
<td></td>
</tr>
<tr>
<td>Cervical Insufficiency</td>
<td>✓</td>
</tr>
<tr>
<td>(short cervix)</td>
<td></td>
</tr>
<tr>
<td>Fetal Macrosomia</td>
<td>✓</td>
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<tr>
<td>Miscarriage</td>
<td></td>
</tr>
<tr>
<td>Placental Abruption</td>
<td>✓</td>
</tr>
<tr>
<td>Oligohydramnios</td>
<td></td>
</tr>
</tbody>
</table>

1. Placenta previa
2. Placenta accreta
3. Vasa Previa
4. Breech Presentation
5. Cervical Insufficiency
6. Fetal Macrosomia
7. Miscarriage
8. Placental Abruption
9. Oligohydramnios
10. Polyhydramnios
11. IUGR
Survey 2 results

### Midwife summary of responses:

- **Average years practicing as a midwife? (in years):** 3.1 years
- **Average length of midwifery training: 2.6 years**
- **Number of babies delivered by midwife per month:** range 0 to 60 (average 15)
- **Average number of antenatal care appointments per day:** 9.3
- **Average gestational age of 1st antenatal appointment:** (in wks) 20 weeks
- **Average number of OB referrals per month:** 6.5
- **Average number of HIV positive patients per month:** 9.8

<table>
<thead>
<tr>
<th>Survey question</th>
<th>Statistical Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>How many years have you been practicing as a midwife? (in years)</td>
<td>Mean: 3.1, Median: 2.5, Range: 0.42 to 12.0</td>
</tr>
<tr>
<td>How long did it take you to complete your training as a midwife? (in years)</td>
<td>Mean: 2.6, Median: 2.5, Range: 0.5 to 4.0</td>
</tr>
<tr>
<td>Do you assist with vaginal deliveries? If yes, approximately how many babies do you help deliver in a month?</td>
<td>Mean: 15.1, Median: 11.0, Range: 0.0 to 60.0</td>
</tr>
<tr>
<td>Approximately how many women do you see each day for antenatal care?</td>
<td>Mean: 9.3, Median: 5.3, Range: 1.5 to 30.0</td>
</tr>
<tr>
<td>At approximately what gestational age do most women first come to clinic for antenatal care? (in wks)</td>
<td>Mean: 19.3, Median: 20, Range: 15.0 to 28.0</td>
</tr>
<tr>
<td>How many antenatal care appointments do most women attend? 1? 2? 3? 4 or more?</td>
<td>Mean: 3.1, Median: 3.3, Range: 1.5 to 4.0</td>
</tr>
<tr>
<td>Approximately how many women do you refer for an antenatal consultation with an OB doctor each month?</td>
<td>Mean: 6.5, Median: 2.5, Range: 0.5 to 50</td>
</tr>
<tr>
<td>Approximately how many women each month do you refer for a C-section during active labor?</td>
<td>Mean: 3.3, Median: 2.5, Range: 0.0 to 8.5</td>
</tr>
<tr>
<td>Approximately how many women each month do you refer for a C-section prior to active labor?</td>
<td>Mean: 1.6, Median: 1.3, Range: 0.0 to 4.0</td>
</tr>
<tr>
<td>Approximately how many patients do you see each month that are HIV positive?</td>
<td>Mean: 9.8, Median: 4.8, Range: 0.5 to 65.0</td>
</tr>
<tr>
<td>Do you manage the care of newborns? If so approximately how many babies do you see in a week?</td>
<td>Mean: 4.0, Median: 3.5, Range: 0.0 to 12.5</td>
</tr>
</tbody>
</table>
Survey 2 Results

Midwives' self assessment

- Understanding of diagnosis and clinical significance
- Comfort level in managing diagnosis

Key:
1: "I do not know what this diagnosis is"
2: "I have a limited understanding"
3: "I am very knowledgeable."

Key Point: The midwives have some understanding of the clinical significance of these conditions, but most lack knowledge in management.
Survey 2 Results

- Free response questions:
  - How do you think ultrasound will help or change your midwifery practice?
  - Do you recall any cases where you (or someone you know) cared for a patient that had a complication (during her antenatal care, delivery or postnatal care) that you think could have been prevented or had a better outcome if the patient had access to ultrasound imaging?
Sample Quotes

♦ “One mother never knew that she had placenta previa because she had not done ultrasound scan. She got some complications and she even lost her baby.”

♦ “Someone was managing a mother in HCII with multiple pregnancy (twins) without knowing and the end a mother delivered the first twin, finally had a retained second twin and in the long of referring her to hospital for further management, both the mother and baby died immediately as they reached in the hospital due to transport delay and long distance covered.”
Results of the 2 surveys were submitted for publication
Key message from survey results

- The midwives received training in how to use ultrasound to diagnose prenatal conditions but there is a lack of knowledge of what to do with that information in the field...
Field Guide

- Clinical resource guide for the management of 11 diagnoses primarily made using ultrasound
- Primary resources used were ACOG guidelines, AAFP articles and Up-to-date
- Uganda specific data was used when commenting on macrosomia and intrauterine growth restriction as normal estimated fetal weights vary in different populations
Example excerpts

**Low Lying Placenta**

http://www.fetalultrasound.com/online/text/33-033.htm

**Placenta Previa**

http://top.elembarazo.net/placenta-previa.html

**Management:**

<table>
<thead>
<tr>
<th>Gestational Age</th>
<th>Management of Low Lying Placenta</th>
</tr>
</thead>
<tbody>
<tr>
<td>16-32 weeks</td>
<td>Follow-up ultrasonography for placental location at 32 weeks</td>
</tr>
<tr>
<td>32-35 weeks</td>
<td>Follow-up ultrasonography for placental location at 36 weeks</td>
</tr>
<tr>
<td>&gt; 35 weeks</td>
<td>If 1-10 mm from os, then perform C-section as soon as labor begins. If 10-20 mm from os, then perform trial of labor, but recommend delivering in a facility that has C-section capabilities.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gestational Age</th>
<th>Management of Placenta Previa</th>
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<tr>
<td>16-32 weeks</td>
<td>Follow-up ultrasonography for placental location at 32 weeks and counsel patient on previa.</td>
</tr>
<tr>
<td>32-35 weeks</td>
<td>Follow-up ultrasonography for placental location at 32 weeks and counsel patient on previa.</td>
</tr>
<tr>
<td>&gt; 35 weeks</td>
<td>Schedule a C-Section at 37 weeks</td>
</tr>
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**Vasa Previa**

Definition – The fetal blood vessels run between the presenting part and the internal cervical os.
- **Type 1**: associated with a velamentous umbilical cord (the placental end of the cord travels within the membranes and is not covered by the protective Wharton's jelly).
- **Type 2**: connect the lobes of a bi-lobed placenta or the placenta and a succenturiate lobe (extra separate lobe of the placenta).
Field Guide

- Multiple revisions were made using feedback obtained from
  - 2 FP/OB physicians
  - 1 radiologist
  - 1 labor and delivery nurse
Field Guide Sent to the Midwives to review
Survey 3

- Requested feedback on how the Field Guide might be helpful. Responses included:
  - “It will guide me on how to identify the risk factors and timely referral”
  - “It helps guide me to be able to identify a topic to use while health educating, like ‘the benefits of delivery at a health facility’”
  - “the field guide will help me to know how to deal with my mothers”
  - “Illustrate the pictures to the mothers. Ask and answer questions about ultrasound. How to health education the mothers about benefits of use of ultrasound.”
  - “It will increase the turn up of mothers for antenatal clinic in the health center. It will add on my skills in identifying diagnosis and early referral of complications. It’s an additional skill to me”
Survey 3

- Requested feedback and recommendations for topics that could be improved:
  - A few requested clarification on the IUGR and macrosomia sections
  - Almost all midwives stated they still find diagnosing vasa previa difficult

- Overall, there was a dramatic increase in the comfort level reported in managing conditions after having been provided the Field Guide
### Pre - training and Field Guide example

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<tr>
<td>Intraterine growth restriction</td>
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### Post - training and Field Guide example

<table>
<thead>
<tr>
<th>Condition</th>
<th>Comfort in diagnosing condition using ultrasound</th>
<th>Comfort in managing patient after training course and reviewing the Field Guide</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not at all comfortable</td>
<td>Somewhat comfortable</td>
</tr>
<tr>
<td>Placenta Previa</td>
<td>v</td>
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Survey 3

- Additional training desired by the midwives:
  - Obstetrical and neonatal emergencies (most common)
  - Care of premature baby and resuscitation
  - Breech deliveries
  - Post abortal care
  - Family planning
At the completion of the 6 week ultrasound training course, 10 of the 12 midwives requested additional training in obstetrical and neonatal emergencies management.

4 FP/OB and OB faculty members from my program at Sutter Health and Dr. Sams, my mentor, have expressed interest in going to Uganda in January 2017 to teach an ALSO course to the midwives.

12/12 of the midwives said they have never received ALSO training (or similar course), but it would be of interest to them.

I have registered for an ALSO instructor course in North Carolina in June of this year during my vacation.

A proposal to sponsor an International Advanced Life Support in Obstetrics (ALSO®) Program has been submitted and is awaiting approval.
NRP Course / Helping Babies Breathe

- The midwives at the 12 clinics are the primary care providers for infants they deliver; none of the health facilities have a physician on site.
- In survey 3, there was expressed interest in neonatal emergency management.
- 10/12 midwives reported never having taken a NRP course or any similar training.
- Helping Babies Breathe is an evidence based educational program to teach neonatal resuscitation techniques in resource limited areas (based off NRP curriculum).
Helping Babies Breathe

- According to the online report of Helping Babies Breath courses conducted, only 2 were taught in all of Uganda in 2015.

- I am planning to go to a weekend Helping Babies Breathe Master Trainers course in early June 2016 in Washington D.C.

- The plan is to incorporate a HBB training course into the schedule before or after ALSO training.
Project Funding

- Dr. Sams and I are currently in the process of applying for grants to fund this project
  - Options we are exploring so far: Bill and Melinda Gates foundation grants, Family Medicine Cares Resident Service Award, Sutter Foundation philanthropy grant

- Estimated costs so far:
  - ALSO course materials: $1,975.70
    - Global CD-ROM: $45
    - Instructor manual: $75
    - Course syllabi: $145 x 12 = $1,750
    - Perineal repair DVD: $10
    - 6 Educational Posters: 6 x $15.95 = $95.70
    - Pelvic models: going to try and borrow
  - HBB course materials: $470
    - Facilitator set: $105
    - Student workbook $20 x 12 = $240
    - Neonatal model $125
  - Midwives’ travel expenses: $466
  - Classroom space rental: $190
  - Instructor round trip flights from U.S. to Uganda: $1,500 x 6 instructors: $9,000
Future Vision

- If our trip in January 2017 is successful and we can continue to secure grant funding, we would like to make this an annual endeavor.

- I am interested in academic medicine and would like to bring medical students and residents interested in global primary care on future trips.

- Once established in a region, we would like to train local providers to become instructors for future courses.

- There are currently discussions about securing visas for midwives from Afghanistan to travel to Uganda to also receive training.
Project Summary

- 3 needs assessment surveys conducted that highlighted knowledge deficiencies in management of prenatal conditions primarily diagnosed with ultrasound

- Survey data compiled into project report submitted for publication

- A Field Guide was created to assist with management of 11 prenatal conditions diagnosed with ultrasound

- Currently arranging a team of instructors to teach ALSO and neonatal emergencies courses in January 2017, hopefully on an ongoing annual basis