Knowledge, Attitudes and Practices of Obstetric Care Providers in Bugesera District, Rwanda

by

Ruchi Puri

Duke Global Health Institute
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Nathan Thielman, Supervisor

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David Boyd

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Jeffrey Wilkinson

Thesis submitted in partial fulfillment of the requirements for the degree of Master in Science in the Duke Global Health Institute in the Graduate School of Duke University

2011
ABSTRACT

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Abstract

There is little information regarding the knowledge, attitudes and practices of obstetric care providers in Rwanda, who are a crucial component of quality Safe Motherhood care. Despite investments in the structural capacity needed to deliver services, little has been directed towards understanding the competency of skilled providers on the frontlines of maternal mortality and morbidity prevention. This study surveyed 87% of all obstetric care providers in the Bugesera District of Rwanda to determine their demographic characteristics, competency in Safe Motherhood knowledge, obstetric practices, and attitudes towards patients and training approaches. The study identified the majority of providers to be A2 level nurses (82%) who have received one year of health education in secondary school. In addition, the majority of providers expressed that both their knowledge (60.6%) and skills confidence (72.2%) across fundamental topics of Safe Motherhood care need improvement. There was a low level of demonstrated knowledge in Safe Motherhood services with a mean of 46.4% of 50 questions answered correctly. Performance of knowledge in normal labor (39.3% correct) and obstetric complications (37.1% correct) were the weakest areas identified. A high percentage of providers (60.8%) engage in the potentially harmful practice of fundal pressure during vaginal delivery, while only 15.9% of providers practice the active management of the third stage of labor in all deliveries. Providers view additional education and training in emergency obstetric care (EMOC) to be very useful in reducing maternal mortality, with 89.3% reporting an enthusiastic willingness for participation in a two-day workshop even if it was their day off. Improving knowledge, skills and practices of obstetric providers is an essential step in improving the quality of emergency obstetric care.
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1. Introduction

1.1 Background

Averting maternal and neonatal mortality has been complicated due to the multifactorial nature of these deaths in resource-limited settings with struggling health systems. The successes of many interventions have been thwarted by the limited availability of services, poor access to care, and lack of knowledge by community members and health providers. These issues are most pronounced in Sub Saharan Africa where the lifetime risk of dying from childbirth is 1 in 20 compared to 1 in 2400 in developed countries like the United States. [1] Contributing to this disparity is the large percentage of women living in rural areas where insufficient transportation, limited availability of skilled obstetric providers, and poor community education impede access to adequate obstetric care.

The situation in Rwanda is equally pronounced with its population of 9.2 million. The maternal mortality ratio rose between 1994 and 2003 from 600 to 1071 maternal deaths per 100,000 live births. [2] More recent mortality figures are mixed. UNICEF cites a reported maternal mortality ratio from national sources of 750 per 100,000 live births between 2005-2008, while in an article published by Margret Hogan in the Lancet using modeled estimates reports a 2008 maternal mortality ratio of 383 per 100,000 live births. [3] The country is making progress with its investments in community based health insurance programs and improving the infrastructural capacity of its primary health centers. [4] According to the 2005 Demographic and Health Survey, the neonatal mortality rate is an estimated 37 per 1000 live births. This represents an improvement to the figures for 2000, when the neonatal mortality rate was 45 per 1000 live births. [5] Rwanda may not meet its Millennium Development 2015 targets for reducing child mortality under the age of 5 by two thirds (MDG 4) or reducing maternal
mortality by three quarters (MDG 5) compared to 1999, but it is on track.

Rwanda has experienced impressive economic growth of roughly 6% per year but the distribution of this growth has yet to make its way outside of urban areas where 78% of the population presently resides and remains vulnerable to reproductive health burdens. [6] Presently, the country has a high fertility rate of 5.5 children per woman, with a population growth rate of 2.8% per year, which is amongst the highest in Africa. In addition, Rwanda has the highest average population density on the continent with 368 inhabitants/km². As of 2000, skilled attendants supervised only 31% of births, although 93% of women had at least one antenatal care visit. Retention and early entry into antenatal care (ANC) may be an equally significant issue with only 23.4% of pregnant women having four or more ANC visits. [7]

The leading causes of maternal mortality in Rwanda, like most developing countries are well documented and include hemorrhage, eclampsia, sepsis, obstructed labor and complications of abortions. All of these conditions require prompt recognition and action to prevent death. In the front line of addressing these conditions are obstetric care providers (OCP) working in community health centers (CHC) whose health training consists of one to two years of nursing during the end of their secondary education. Patients referred from primary health centers to district hospitals are often placed in the care of general medical doctors who have not received specialty training in obstetrics and gynecology. Determining the ability of providers to recognize and manage conditions causing maternal and neonatal deaths, as well as their attitudes and clinical practices are necessary to developing appropriate educational interventions capable of improving emergency obstetric care (EMOC).

Several strategies for reducing maternal and neonatal mortality have been utilized with varying results. The more promising strategies have ranged from
community mobilization, financial incentives, community referral and transport systems, and perinatal screening. [8] Few data document or match the need and benefit of EMOC education and training of providers as potential interventions in the reduction of maternal and neonatal mortality. Quantitative data addressing the knowledge of providers and their capacity to deliver emergency obstetric care services may identify education and training as useful interventions for improving EMOC. Prior to exploring the utility of EMOC training, baseline information on how obstetric care providers perceive and manage obstetric emergencies and their willingness to adopt and facilitate these strategies for patients maybe useful.

Knowledge, Attitudes and Practice Surveys (KAPS) provide systematic information to assist policy makers and health officials in developing programs, services and interventions for broader populations. [9] Data collected from KAPS may assist in identifying programmatic needs and implementing interventions targeting maternal and neonatal mortality. The knowledge aspect of the survey is directed at determining what providers understand about problems and their ability to recognize a problem when it presents. Attitude questions provide information about how providers feel towards the subject. These questions also address potential assumptions providers make on what are considered to be appropriate management decisions in handling obstetric emergencies, which may have originated within their community but have a potential negative impact on care. Practice refers to the ways providers act when confronted with these issues. In the context of maternal and neonatal mortality, varying understandings and discrepancies in the practices and beliefs of obstetric providers may run counter to standards set by specialists in obstetrics and gynecology and the public health community. Identifying these behaviors and beliefs in the primary health strata of the
Rwandan health system can allow for appropriate interventions with a greater likelihood of compliance by the healthcare community.

1.2 Scientific Rationale

To date, there have been no studies in Rwanda assessing knowledge, attitudes or practices of obstetric care providers at the community and districts level with regards to Safe Motherhood. While similar studies have been done in Western Africa and Asia, few have been quantitative and spanned multiple provider levels within a district. In addition, there maybe unique social and cultural influences occurring in Rwanda justifying the need for region specific data collection. Multiple levels of a health system need to be engaged to affect maternal and neonatal outcomes and it will be necessary to understand the thoughts and perceptions of providers serving at each of these levels. Quantifying the knowledge, attitudes and perception towards maternal and neonatal mortality among obstetric providers can help to identify useful interventions and ensure provider compliance. In addition, it may provide evidence for comprehensive EMOC training among these providers.
1.3 Objectives

- Use a quantitative survey method to determine Safe Motherhood knowledge among obstetric providers in the Bugesera District;
- Identify obstetric providers attitudes towards the prevention and management of conditions causing maternal mortality;
- Determine obstetric providers practices in addressing conditions causing maternal mortality.
- Determine priority areas for programmatic interventions to improve maternal and neonatal outcomes at district hospitals and primary health centers in Bugesera District;
- Identify knowledge gaps of obstetric care providers in the identification and management of patients requiring emergency obstetric care services;
- Identify appropriate teaching methodologies and interventions to address the learning needs of obstetric providers in emergency obstetric and neonatal care at the primary health care level.

1.4 Hypothesis

There maybe a significant gap in knowledge of obstetric providers based on the type a training they have had, their years of experience, and the amount of obstetric care they provide. This gap may also be reflected in the types of obstetrical practices reported, as well as their performance on knowledge assessment.
2. Methodology

2.1 Study Design

The study design uses quantitative survey method established by JHPIEGO to evaluate the knowledge, attitudes and practices of maternal health providers working at a primary health level. The survey questionnaire has been translated into Kinyarwanda and includes an additional demographic and practice assessment to evaluate the specific learning needs in emergency obstetrics as it pertains to the infrastructure and capacity of the Bugesera district. There were an estimated 200 obstetric providers employed by the Rwandan Ministry of Health in the Bugesera District, which made it possible to target all providers for the study population.

2.2 Study Site

The Bugesera district is located in the Eastern Province of Rwanda and has an area of about 1337 square kilometers. [10] The district is divided into 15 sectors, which encompasses 581 villages with a population 274,113 people according to the 2006 Rwandan population census. Out of this 142,134 (52%) are women, with approximately 31% of the total female population being of reproductive age. [11] Figure 1 is a map of Rwanda with its districts outlined and Figure 2 depicts the Bugesera district and outlines the boundaries of its 15 sectors.
Figure 1: Map of Rwanda by District

Figure 2: Map of Bugesera District by Sector
Out of the 15 sectors, 12 have community health centers (CHC), which function as primary health facilities. The CHC offer no surgical services, operative deliveries, misoprostol or blood transfusions. There are no medical doctors and most of the skilled health providers are A2 level nurses within the health centers. A2 nurses have received one year of generalized nursing education during their secondary schooling. There are four ambulances shared by the district hospitals and CHCs. Table 1 lists the current CHC named for the sector in which they reside.

**Table 1: List of Community Health Centers in Bugesera District**

- Gakurazo
- Gihinga
- Gashora
- Rilima
- Kamabuye
- Nyamata
- Ruhuha
- Nzangwa
- Mayange
- Mareba
- Mwogo
- Ngeruka

In addition to the community health centers, there is one district hospital in Nyamata, which employs 10 medical doctors. Three of the doctors are dedicated to the maternity ward, along with two midwives and 12 nurses. There is no specialist in Obstetrics and Gynecology working in the Bugesera District. The Nyamata hospital is the only facility to offer cesarean or operative deliveries. If needed, patients are
transported to Kigali University Training Hospital (CHUK) or King Faisal Hospital, which serves as tertiary referral hospitals for the district, which is approximately 45 minutes away by vehicle from the district hospital.

2.3 Selection of the Study Site and Population

Bugesera district was chosen based on the recommendation of the Rwandan Ministry of Health as an area with high maternal and neonatal mortality. Among the several interventions being explored to reduce national maternal and neonatal deaths is the role of widespread EMOC training at the district and CHC facility level. In order to determine the need for this intervention and the potential impact of EMOC training it was important to gather baseline data on demographics, knowledge, attitudes, practices, and receptivity of providers in order to establish learning needs. By focusing on the knowledge, attitudes and practices of obstetric care providers working in the district, potential knowledge gaps and barriers to the successful implementation of EMOC training could be identified.

There are 168 maternal health providers estimated to be within the 12 CHC within the Bugesera district. They are all nurse level providers with no medical doctors or trained midwives. All of these skilled health providers were asked to participate in the quantitative survey to determine their baseline clinical knowledge of maternal and neonatal risk during pregnancy, as well as practices in the delivery of emergency obstetric care. In addition, quantitative survey methods were implemented to evaluate both provider attitudes and practices.

Inclusion: All skilled health providers in Bugesera District providing obstetric care who consented to participation.

Exclusion: Healthcare providers, who did not meet the above criteria, were not
available during the survey period or did not consent to participation.

2.4 Summary of Procedures

Data was collected during the last week of November 2010, with data entry done shortly after in December of 2010 using Filemaker Pro 10. Recruitment of subjects targeted all obstetric care providers working in the Bugesera District of Rwanda’s Eastern Province. Study activities were conducted in collaboration with the Rwandan Ministry of Health, National University of Rwanda and Duke University Global Health Institute. Participants included medical doctors, midwives, and nurses at Nyamata District Hospital, as well as obstetric care providers at community health centers. Due to the number of total providers working in the district it was feasible to survey the entire population of obstetric caregivers.

A well-established quantitative knowledge, attitudes, and perception survey developed by JHPEIGO from the monograph, *Monitoring Birth Preparedness and Complication Readiness: Tools and Indicators for Maternal And Newborn Health*, as well as, *Guidelines for Assessment of Skilled Providers After Training in Maternal and Newborn Healthcare*, was adopted as the primary survey instrument. This survey is well established for the developing low resource setting and has been used to assess maternal neonatal healthcare in Burkina Faso, Guatemala, Indonesia, and Nepal, Burkina Faso, Kenya, and Tanzania. Translation of the JHPEIGO tool into Kinyarwanda was necessary since this is the most common language spoken in the district. In addition, a demographic survey with an instrument for provider’s self-assessment and self-reporting of practices was developed and translated in Kinyarwanda. The translated instrument was then back translated into English. Appendix A contains the instrument
in English and Kinyarwanda. The survey was piloted among seven obstetric providers at a community health center in a district within Kigali. Minor revisions made to ensure coherence after the piloting and prior to data collection. Native Kinyarwanda speakers were trained to administer the instrument, obtain informed consent from participants and address questions, as well as provide clarification to participants. Each survey was administered as a written questionnaire in Kinyarwanda to each participant. To ensure anonymity, there was no identifying information on the survey.

Once the data collection period was completed the information was entered into FileMaker Pro 10 and then exported in Microsoft Excel where it was coded. Data analysis was performed using Jump 9 software. All computers storing data from the study were password protected.

### 2.5 Ethical Review

The study protocol, survey forms, and modifications were reviewed and exempted by the Institutional Review Board of the Duke University Medical Center (see Appendix C) and the Kigali University Teaching Hospital Institutional Review Board. Guidelines were met with respect to content and regulation of applicable research to human subjects.

### 2.6 Participant Recruitment

Obstetric care providers were identified at Nyamata District Hospital and each CHC with the assistance of the Medical Director of Nyamata and each Titulair (the head of the CHC). Participants were asked to participate in the study in person at their facility of work by a trained data collector. No compensation was provided for participation in
conjunction with MOH guidelines since participants were surveyed during their work hours and did not incur cost of transport.

2.7 Informed Consent

Each participant did receive written and verbal explanation of the study by the study staff in Kinyarwanda prior to receiving the survey instrument. Consent documents are listed in Appendix B. Documentation of consent was verbal, which was in accordance with the study’s IRB exempt status

2.8 Confidentiality

Confidentiality was strictly maintained for study subjects. All study-related information is stored in a de-identified manner and results of performance of individual participants cannot be linked back to individuals. The original survey records remain in Rwanda under the responsibility of Stephen Rulisa a co-investigator of the study.

2.9 Data Collection

Data collectors were trained in consent methods and administration of the survey over a one-day session. Data collectors were paired in groups of two and sent to health centers three times in order to capture the entire obstetric workforce providing care. The entire collection period was conducted over a total seven days.
3. Results

Data was entered in Filemaker Pro version 10 and exported to Excel where the data was cleaned and coded. All descriptive and statistical analysis of data was conducted in Jump Pro 9 software.

3.1 Summary of Demographic Data

The number of health providers delivering obstetric care in the Bugesera district at the time of the study was 193. The study captured 168 (87%) providers, with 18 missing due to absenteeism, one provider refused to consent, and six surveys were not used because less than 80% of the knowledge assessment questions were answered. The average age of providers was 30.3 years (Range 20-54, SD 6.25 years), with 53 (32%) being male and 113 (68%) female. Table 2 outlines basic demographic details of participants according to their level of training. A2 nurses were the largest proportion of obstetric providers in Bugesera District as 82% of all providers. Among all respondents, 18.9% reported doing less than 5 hours of obstetrics per week, 27.7% reported 5-10 hrs/wk, 16.3% reported 10-20 hrs/wk, while the largest portions of 37.1% reported spending >20 hrs/wk delivering obstetrics care. The monthly rate of obstetric deliveries among all respondents ranged from 26% reporting <5 deliveries, 32% reporting 5-10 deliveries, 26% reporting 10-20 deliveries, 9% reporting 20-30 deliveries, and 7% reporting >30 deliveries per month.
Table 2: Summary of Demographic Data of Study Participants

<table>
<thead>
<tr>
<th>Type of provider</th>
<th>Total</th>
<th>MD</th>
<th>A1 Midwife</th>
<th>A1 Nurse</th>
<th>A2 Nurse</th>
<th>A3 Nurse</th>
<th>No response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of provider</td>
<td>168</td>
<td>8</td>
<td>3</td>
<td>15</td>
<td>137</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>MEAN months of obstetrics experience</td>
<td>43 (+/-37.9)</td>
<td>31 (+/-16.3)</td>
<td>38 (+/-48.8)</td>
<td>23 (+/-23.3)</td>
<td>44 (+/-37.5)</td>
<td>77 (+/-64.1)</td>
<td>10</td>
</tr>
<tr>
<td>Comfort with language (Five point scale 0 is not fluent increasing to 5, which is fluent)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kinyarwanda</td>
<td>4.8</td>
<td>4.9</td>
<td>4.3</td>
<td>4.9</td>
<td>4.8</td>
<td>4.8</td>
<td>21</td>
</tr>
<tr>
<td>French</td>
<td>4.1</td>
<td>4.6</td>
<td>4.5</td>
<td>4.6</td>
<td>4.1</td>
<td>4.0</td>
<td>5</td>
</tr>
<tr>
<td>English</td>
<td>1.9</td>
<td>3.1</td>
<td>4.3</td>
<td>2.7</td>
<td>1.7</td>
<td>0.3</td>
<td>8</td>
</tr>
<tr>
<td>Exposure to Emergency Obstetrics Training</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EMOC training in school</td>
<td>116 (70.1%)</td>
<td>7 (88%)</td>
<td>2 (67%)</td>
<td>12 (80%)</td>
<td>92 (69.1%)</td>
<td>5 (60%)</td>
<td>5</td>
</tr>
<tr>
<td>EMOC training since working</td>
<td>46 (28%)</td>
<td>2 (25%)</td>
<td>2 (67%)</td>
<td>3 (21%)</td>
<td>37 (27%)</td>
<td>2 (40%)</td>
<td>4</td>
</tr>
</tbody>
</table>

Prior to testing provider’s knowledge in aspects of obstetric care, participants were asked to rate their own knowledge in specific areas of obstetric care, as well as their confidence in executing certain relevant skills. They were also asked what educational activities could help improve maternal mortality. Table 3 summarizes these findings. Comparisons between the types of providers (MD, Midwives, A level nurses) were not performed because of the small number of providers within some of these categories. Hence, only a descriptive analysis is offered because of the lack of power.
Table 3: Summary of Provider’s Perceived Knowledge and Confidence Level in Obstetric Care Delivery

<table>
<thead>
<tr>
<th>Rating of Knowledge in managing the following in</th>
<th>WEAK</th>
<th>NEEDS IMPROVEMENT</th>
<th>ADEQUATE</th>
<th>EXCELLENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composite rating of knowledge</td>
<td>2 (1.3%)</td>
<td>97 (60.6%)</td>
<td>50 (31.3%)</td>
<td>11 (6.9%)</td>
</tr>
<tr>
<td>Hemorrhage</td>
<td>12 (7.2%)</td>
<td>101 (60.8%)</td>
<td>41 (24.7%)</td>
<td>12 (7.2%)</td>
</tr>
<tr>
<td>Preeclampsia and Eclampsia</td>
<td>28 (16.9%)</td>
<td>98 (59.3%)</td>
<td>29 (17.6%)</td>
<td>10 (6.0%)</td>
</tr>
<tr>
<td>Puerperal Infection</td>
<td>34 (20.5%)</td>
<td>89 (53.6%)</td>
<td>33 (19.9%)</td>
<td>10 (6.0%)</td>
</tr>
<tr>
<td>Active Management of Third Stage of Labor</td>
<td>9 (5.3%)</td>
<td>104 (62.2%)</td>
<td>39 (23.3%)</td>
<td>15 (9.0%)</td>
</tr>
<tr>
<td>Partograms and Routine Labor</td>
<td>10 (6.0%)</td>
<td>75 (44.9%)</td>
<td>54 (32.3%)</td>
<td>28 (16.8%)</td>
</tr>
<tr>
<td>Neonatal Resuscitation</td>
<td>5 (3.0%)</td>
<td>95 (57.6%)</td>
<td>45 (27.2%)</td>
<td>20 (12.1%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rating of Confidence in Skills in Managing the Following Emergencies</th>
<th>WEAK</th>
<th>NEEDS IMPROVEMENT</th>
<th>ADEQUATE</th>
<th>EXCELLENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composite rating of confidence</td>
<td>17 (10.8%)</td>
<td>114 (72.2%)</td>
<td>20 (12.7%)</td>
<td>7 (4.4%)</td>
</tr>
<tr>
<td>Hemorrhage</td>
<td>14 (8.4%)</td>
<td>109 (65.7%)</td>
<td>35 (21.1%)</td>
<td>8 (4.8%)</td>
</tr>
<tr>
<td>Eclampsia</td>
<td>40 (24.3%)</td>
<td>90 (54.9%)</td>
<td>26 (15.9%)</td>
<td>8 (4.9%)</td>
</tr>
<tr>
<td>Sepsis</td>
<td>68 (42.0%)</td>
<td>74 (45.7%)</td>
<td>11 (6.8%)</td>
<td>9 (5.6%)</td>
</tr>
<tr>
<td>Shoulder Dystocia</td>
<td>32 (19.2%)</td>
<td>109 (65.7%)</td>
<td>22 (13.2%)</td>
<td>3 (1.8%)</td>
</tr>
<tr>
<td>Neonatal Resuscitation</td>
<td>10 (6.0%)</td>
<td>93 (56.7%)</td>
<td>51 (31.1%)</td>
<td>10 (6.0%)</td>
</tr>
</tbody>
</table>

3.2 Summary of Knowledge Scores

Assessment of provider’s knowledge was broken up into five areas of Safe Motherhood care: routine antenatal care, normal labor, newborn care, obstetric
complications, and postpartum care. Each section contains 10 questions so that the entire knowledge assessment is calculated from a 50-question survey. Table 4 summarizes the scores in each section as the mean percent correct and 95% confidence interval for all providers surveyed. There was no statistically significant difference in the level of knowledge measured based on the type of provider, months of experience providing obstetrical care, frequency of deliveries per month, or number of hours averaged per week delivering obstetrical care. Women who averaged 47.7% correct (95% CI 46.0-49.5%), did have significantly higher scores than men (43.1%, 95% CI 40.1-46.1), using an analysis of variance with probability >F of 0.0058.

Table 4: Mean Percent Correct. Standard Deviation, and 95% Confidence Interval of Knowledge Scores

<table>
<thead>
<tr>
<th></th>
<th>Antenatal care</th>
<th>Normal labor</th>
<th>Newborn care</th>
<th>Obstetric complications</th>
<th>Postpartum care</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Providers</td>
<td>53.6% (95% CI 51.2-56.0%)</td>
<td>39.3% (95% CI 37.0-41.5%)</td>
<td>43.8% (95% CI 41.3-46.2%)</td>
<td>37.1% (95% CI 34.9-39.4%)</td>
<td>58.0% (95% CI 55.1-60.9%)</td>
<td>46.4% (95% CI 44.8-47.9%)</td>
</tr>
</tbody>
</table>

3.2.1 Role of prior EMOC training on knowledge performance

The majority of providers surveyed had been given formal EMOC training at some point during their career or training. 29.2% of providers reported not having any EMOC training, while 45% reported having training either as a student or since employed, and 25.6% of providers reported having some EMOC training during both their education and employment. The majority of participants (70.7%) did report receiving EMOC training during their education and 27.9% reported having EMOC training since starting work.

There was no statistical difference in knowledge performance when comparing those who had no EMOC training (45.8%, 95% CI 43.4-48.3%) to those who had any
EMOC training (46.6%, 95% CI 44.7-48.55%). Using an analysis of variance there was no significant difference in knowledge performance based on whether a participant had received any EMOC training nor was there a significant difference in knowledge scores based on the number of times a participant had received EMOC training. A sub-analysis to see if antenatal care, normal labor, newborn care, obstetric complications or postpartum care knowledge were individually impacted by prior EMOC training was performed but no statistically significant differences were noted.

3.2.2 Role of provider experience on knowledge performance

There was no significant correlation between the numbers of months participants had been practicing obstetrics and the number of knowledge questions they answered correctly. Nor was there a difference in the average weekly number of obstetric care hours or the number of deliveries performed monthly and the percent of questions answered correctly when applying an analysis of variance.

3.2.3 Correlation of knowledge perception and confidence and demonstrated knowledge

The majority of participants expressed some degree of inferior knowledge and confidence previously summarized in table 3. Table 5 looks at the mean percent correct based on the level of perceived knowledge and confidence expressed. There were no statistically significant differences in demonstrated knowledge by either of these variables. A lack of difference suggests that providers who feel highly confident or knowledgeable lack insight into their own knowledge competency. In addition, sub-analysis performed did not demonstrate a statistically significant correlation when only looking at knowledge competency with normal labor, complications and neonatal care
with perceived knowledge scores or confidence levels in these specific topics reflecting similar deficiencies across topics.

Table 5: Mean Percent Correct Total Knowledge Score and Standard Deviation Based on Self-Perceived Knowledge and Provider Confidence with Skills

<table>
<thead>
<tr>
<th></th>
<th>WEAK</th>
<th>NEEDS IMPROVEMENT</th>
<th>ADEQUATE</th>
<th>EXCELLENT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Self-Perceived</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessment of Overall</td>
<td>39.0% (+/ - 4.2%)</td>
<td>46.3% (+/ - 9.5%)</td>
<td>48.8% (+/ - 10.4%)</td>
<td>42.3% (+/ - 12.1%)</td>
</tr>
<tr>
<td>Knowledge</td>
<td>(n=2)</td>
<td>(n=97)</td>
<td>(n=50)</td>
<td>(n=11)</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confidence in Skills</td>
<td>41.5% (+/ - 9.7%)</td>
<td>47.1% (+/ - 8.9%)</td>
<td>48.9% (+/ - 13.1%)</td>
<td>42.0% (+/ - 15.1%)</td>
</tr>
<tr>
<td></td>
<td>(n=17)</td>
<td>(n=114)</td>
<td>(n=20)</td>
<td>(n=7)</td>
</tr>
</tbody>
</table>

**3.3 Summary of Practices**

Recognizing the difficulties in assessing provider’s practice, this survey attempts to collect formative preliminary data using self-reporting method on the most basic aspects of routine health delivery. The practices this survey examined were fundal pressure, the active management of the third stage of labor (AMTSL), uterine massage, and referral. Participants were asked to estimate the proportion of deliveries in which they utilized these activities.

**3.3.1 Fundal Pressure**

Fundal pressure during vaginal birth is now a widely considered to be harmful during any vaginal delivery. During obstetric emergencies like shoulder dystocia, the practice can be traumatizing to both mother and child. Providers were asked how often they administer fundal pressure with the optimal response being zero percent of the time. The practice is still evident amongst providers, with 60.8% reporting the use of the
maneuver and 10.7% report using it greater than 50% of vaginal deliveries. Among all providers, 8% felt an adequate or excellent level of confidence with managing shoulder but also reported using fundal pressure during vaginal birth.

3.3.2 Active Management of the Third Stage of Labor

AMTSL is a standard practice for all deliveries and a widely accepted maneuver to reducing the rate of post partum hemorrhage. AMTSL involves the administration of oxytocin and controlled cord traction. [12] Uterine massage is another maneuver commonly used once the placenta has been delivered to promote contraction of the uterus and decrease blood loss. [13] In the Bugesera District, oxytocin is available at all facilities providing obstetrical care. The mean percent administration of oxytocin for all deliveries was reported to be 80.4% (95% CI 74.9-85.9), cord traction 40.2% (95% CI 33.0-47.3), and uterine massage was reported 43.3% (95% CI 36.1-50.6) of the time. Only 15.9% of providers report practicing all three steps 100% of the time, while 31.7% reported doing all three > 50% of the time. Meanwhile 8.9% reported never doing any of the three steps.

There were three questions specific to assessing providers’ knowledge of the AMTSL. While there was no statistical difference noted in the demonstrated knowledge of AMTSL and providers reported practice; there was a trend of note. Observed was a disconnect of 23% of all providers answering all three questions correctly but failing to report doing all three steps in 100% of their deliveries, while 6% of providers answered all three questions correctly and also reported practicing all three steps 100% of the time.

A provider having any experience receiving emergency obstetric care also did not significantly impact their specific knowledge of AMTSL or their reported practice of AMTSL. Among the 71% of providers exposed to EMOC training, only 34% of providers
answer all three questions correctly and 17% of providers actually reported performing all three steps 100% of the time.

### 3.3.3 Referral of Patients and Advice Seeking

Since the district contains primary health centers and a district hospital, all facilities have an upstream referral facility and mechanism of transfer since the district shares four ambulances. The majority of providers (38.8%) report that they very rarely refer patients, 5% state they never refer, 11.5% report monthly referrals, while 25% report weekly referrals, and 18.8% report daily referral. Regarding seeking advice from a senior provider including mobile phone consultation: 16.9% report never doing so, 37.6% state rarely, 12.7% report seeking advice on a monthly basis, 9.1% report weekly, and 23% report seeking advice daily. While gender did not affect patterns of referral, women were more likely than men to seek advice from seniors with a likelihood ratio of $p=0.0433$. There is a likely bias in this value since men who made up 31.9% of the sample, 15% of them were medical doctors. There were no female medical doctors in the entire population.

### 3.4 Summary of Attitudes and Perceptions

The JHPEIGO survey asks specific questions regarding providers’ attitudes and perceptions toward mothers and their partners’ responsibility towards obtaining care. A Likert scale is used to quantify responses. Table 6 offers a summary of findings for all providers. Additional questions were included to gauge what providers felt would be beneficial learning tools to improving their skills and knowledge for the delivery of Safe Motherhood services. Table 7 summarizes providers’ attitudes to specific EMOC learning interventions aimed at reducing maternal mortality at their facility. When
providers were asked about their willingness to attend a two-day workshop in EMOC, 89.3% stated that they would enthusiastically attend even it was their day off, while 3% said they would attend only if it counted as their regular work day and 2.4% stated they would attend only if it was required, 1.8% admitted to having no interest in the subject.

**Table 6: Summary of Providers Attitudes Towards Obstetric Care**

<table>
<thead>
<tr>
<th>JHPIEGO ATTITUDE QUESTIONS ON CARE</th>
<th>STRONGLY AGREE</th>
<th>AGREE</th>
<th>DISAGREE</th>
<th>STRONGLY DISAGREE</th>
<th>DON'T KNOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>A woman should plan ahead of time where she will give birth to her baby</td>
<td>73.8%</td>
<td>19.6%</td>
<td>4.2%</td>
<td>0.6%</td>
<td>1.8%</td>
</tr>
<tr>
<td>A woman should plan ahead of time how she will get to the place where she will give birth</td>
<td>72%</td>
<td>25.6%</td>
<td>2.4%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>It is not necessary for a husband/partner to accompany his wife to antenatal care visits</td>
<td>16.1%</td>
<td>19.0%</td>
<td>28.6%</td>
<td>32.7%</td>
<td>3.6%</td>
</tr>
<tr>
<td>When women do not go to a health facility to give birth, it is mainly because it is too expensive</td>
<td>3.6%</td>
<td>6.5%</td>
<td>41.1%</td>
<td>43.5%</td>
<td>5.4%</td>
</tr>
<tr>
<td>When women do not go to a health facility to give birth, it is mainly because it is too difficult to get there</td>
<td>5.4%</td>
<td>17.9%</td>
<td>37.5%</td>
<td>29.8%</td>
<td>8.9%</td>
</tr>
<tr>
<td>When women do not go to a health facility to give birth, it is mainly because the staff there do not treat women respectfully</td>
<td>2.3%</td>
<td>10.1%</td>
<td>39.3%</td>
<td>39.3%</td>
<td>7.8%</td>
</tr>
<tr>
<td>It is not necessary for a husband/partner to accompany his wife when she is giving birth</td>
<td>8.9%</td>
<td>8.9%</td>
<td>37.5%</td>
<td>41.1%</td>
<td>3.6%</td>
</tr>
<tr>
<td>Giving birth is mostly a woman’s matter. Husbands/partners have little to contribute</td>
<td>3.6%</td>
<td>5.4%</td>
<td>39.3%</td>
<td>48.8%</td>
<td>2.4%</td>
</tr>
</tbody>
</table>
Table 7: Providers Attitudes Towards EMOC Educational Interventions to Reduce Maternal Mortality

<table>
<thead>
<tr>
<th>PROPOSED EDUCATIONAL INTERVENTION TO REDUCE MATERNAL MORTALITY</th>
<th>% OF PROVIDERS REPORTING LEVEL OF USEFULNESS OF EACH EDUCATIONAL INTERVENTION (1= NOT VERY USEFUL, 5=VERY USEFUL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading material for independent study in EMOC</td>
<td>6.0%  3.0%  10.3%  8.5%  72.1%</td>
</tr>
<tr>
<td>Guest Speakers on EMOC</td>
<td>1.8%  0%  5.5%  9.1%  83.5%</td>
</tr>
<tr>
<td>Posters outlining EMOC procedures</td>
<td>1.8%  1.2%  8.5%  7.9%  80.6%</td>
</tr>
<tr>
<td>One time workshop on EMOC</td>
<td>13.6%  8.0%  13.6%  12.3%  52.5%</td>
</tr>
<tr>
<td>Annual workshops and certifications in EMOC</td>
<td>4.2%  1.8%  3.7%  8.5%  81.7%</td>
</tr>
</tbody>
</table>

4. Discussion

The data presented in the results section provides a descriptive assessment of the characteristics of maternal health providers delivering obstetric care in the Bugesera District of Rwanda. The survey captured 87% of all providers practicing in the district demonstrating a good representation of the defined study population. The providers are young (30.3 years, Range 20-54, SD 6.25 years), with female providers (68%) outnumbering male providers (2:1). The providers are early in their careers with average practice duration of 3.6 years. In addition, the majority of providers (93.5%) and therefore the majority of care are being delivered by a cadre of people (A level nurses) who have had minimal health education and training. There are also very few doctors serving the Bugesera district; all are male practicing in the district hospital and are also early in their careers just averaging 2.6 years of medical experience. In addition, the majority of providers are fluent in Kinyarwanda, followed by French and very limited fluency in English. Any instruction targeting these providers should ideally be in Kinyarwanda or French. Attempting to utilize the many English-only based courses available in this community is unlikely to impart effective knowledge transfer. Performing a statistically relevant sub-analysis to identify correlations and possible confounding of variables affecting knowledge competency such as type of provider, months of experience and volume of deliveries was not possible because of the small numbers in some groups. Although this study contains a representative population of providers in the district it is underpowered to make any conclusions along these lines. At best we can look at these numbers as pilot data establishing the value for future studies robustly designed to address these issues.
4.1 Competency of Providers Knowledge

The overall competency of knowledge demonstrated is poor with the mean score correct for all providers being 46.4%. While there is no existing data to compare these providers knowledge to other providers in the region, answering less than 50% of questions correctly is unlikely to represent a passing level of knowledge for most professional certification standards. Providers seemed more comfortable with knowledge of antenatal care (53.6%) and postpartum care (58%) but scored worst with their knowledge of obstetric complications (37.1%) and normal labor (39.3%). This data provides insight into providers learning needs. If there is to be further reductions in maternal mortality, improvements to providers’ knowledge of normal labor and obstetric complications are necessary since this is when women are most vulnerable. Providers must be knowledgeable in what these complications are, competent in recognizing their clinical manifestations, and then skilled in delivering treatment. Medical and surgical interventions in obstetrics are known to be effective life saving actions when practiced. In addition, medications and simple manual procedures are inexpensive, low-tech and available in Bugesera, as well as other low-resource settings. Improving providers’ knowledge specifically in EMOC is a critical step in averting maternal death and disability. We are now moving into an era where investments in structural capacity building are coming to fruition along with improvements to access to care. [14] Yet, this appears to be just half the battle since the capacity and knowledge of providers is also an essential component to quality health care delivery necessary to impact health outcomes. [15]

Women performed significantly higher in their overall knowledge scores compared to men. It is possible that women have better insight through personal experience, as well as being favored providers by patients giving them more experience.
There were no statistically significant differences in scores across the types of providers with the eight doctors having a mean score of 47.8% (95% CI 34.7-60.7) compared to the majority of 137 A2 nurse providers scoring 46.3% (95% CI 44.6-47.9). Again the study is underpowered to make inferences of impact of provider type, experience level and training on knowledge competency.

Overall, the majority of providers fall in the middle of how they view their own knowledge and confidence level with the majority expressing a need for improvement across the specified areas of Safe Motherhood services. Yet, perceived knowledge and expressed confidence level did not appear to be a predictor of knowledge performance. This may be the result of the majority of providers feeling similarly about their knowledge and confidence, thus scoring comparably, which left the study underpowered to detect any differences across the groups. Of note, eleven individuals who felt their knowledge was excellent, scored 42.3% (95% CI 34.2-50.5) compared to the 97 who expressed a need for improvement with a mean score of 46.3% (95% CI 45.8-5.7). The group of 50 who felt their knowledge was adequate did have the highest scores at 48% (95% CI 45.8-51.7). A similar trend was noticed with knowledge scores and expressed confidence level.

While the majority of providers (70.7%) had some exposure to EMOC training either as a student, since being employed or both, it did not seem to impact overall knowledge competency or even specific competency with knowledge of AMTSL and complications in pregnancy. There could be multiple factors affecting this data, such as the type of training, the interval time since training, or the quality of training. Participants were asked to list information about the EMOC training they received but the majority was not able to. In fact, among those who did list courses some referred to training relating to HIV education and prevention of mother to child transmission of
HIV. This called into question what providers consider as suitable EMOC training. There were not enough responses identifying types of EMOC courses taken by providers to make any meaningful inferences on course type and impact on knowledge competency.

4.2 Provider Practices

Self-reporting of provider practices is not the ideal approach to understanding what providers actually do when seeing patients. One may expect there to be an overstatement of what care is truly being provided. Self-reporting was the approach adopted to gather at least preliminary information of the type of care being provided. As a result, the study targeted one negative practice, fundal pressure; one positive practice proven to decrease the risk of post-partum hemorrhage, the AMTSL; and finally referral and advice seeking which is the medically appropriate practice under conditions of limited surgical capacity and availability of blood products at health centers. Despite using a self-reporting mechanism of data collection, providers admitted to some concerning practices, which may warrant more in depth study of the gambit other practices providers engage in. For example, the majority of providers (60.8%) engage in the use of fundal pressure, which has a potentially negative impact for the mother and child during vaginal birth. The frequency of its use is not a rare occurrence with 10.7% of providers relying on the practice for greater than 50% of vaginal deliveries.

AMTSL is a low tech and low cost routine practice advocated for all births. It can reduce the risk of patients developing a postpartum hemorrhage, the leading cause of maternal mortality globally, while also minimizing blood loss during delivery, which can contribute to anemia in patients. It is a skill that is focused upon in many EMOC training courses and is an essential practice in routine obstetric care. Routine
administration of oxytocin, 80.4%, (95% CI 74.9-85.9) mean reported use during all deliveries by all providers, was the most commonly adopted practice. This alludes to the widespread availability of the medication, which one would expect to be the main rate-limiting factor towards implementation but also used the least compared to the other maneuvers. Conversely, the two approaches of controlled cord traction (40.2%, 95% CI 33.0-47.3) and uterine massage (43.3%, 95% CI 36.1-50.6), which are simple cost free skills are the least utilized by providers. Improving the practice of these skills in a targeted manner should be of greater focus in future trainings or workshops. It also suggests a lagging capacity of prior EMOC courses to adequately affect knowledge transfer.

The reported frequency of patient referral and advice seeking practices provide insight to there use by providers. CHC are limited in their capacity for surgical intervention, administration of blood products and ability to cope with even minor complications. While one may not expect the frequent need for referral due to life threatening conditions, it should still not be a rare practice because of these conditions. Yet the majority of participants (38.3%) report rarely referring patients. Advice seeking also had an unexpected bi-modal distribution where 37.6% reported rarely seeking advice and 23% reported seeking advice daily. Women were statistically more likely to seek advice compared to their male counterparts. Understanding what motivates providers to seek advice or motivates referral of patients maybe significant in developing interventions that improve quality of care especially in light of the low levels of providers’ confidence and knowledge competency but also constraints on the possible types care deliverable in the district.
4.3 Provider Attitudes towards patients and education

Overall the attitudes expressed by providers regarding the responsibility of women and male partners to be involved in antenatal care and birth preparedness is encouraging. The majority of providers did express beliefs in male partners necessary involvement in all aspects of the pregnancy, which was a positive finding. Providers did not feel that costs of care and barriers to reach the facility were reasons for patients not presenting to health facilities for care. In fact, this may mark recent improvements to the health system in Rwanda. For example, the country began a community based health insurance program in 1999, which costs a household the equivalent of 7.50 USD per year to become members and thirty cents per visit. [16,17] In addition, while the main road to Bugesera was tarred, none of the internal roads were, but they were grated and easily maneuverable by both bicycle and motorbikes, which were readily available. While not part of this study, it would be interesting to see if responses from community members mimic the responses of providers.

Providers demonstrated a high level of interest towards receiving more education and training in emergency obstetrics care in order to improve maternal mortality in the district. Interventions such as guest speakers (83.5%), posters (80.6%), and recurrent annual workshops (81.7%) were considered to be very useful approaches by the majority of all providers. It is clear that providers have a preference for repetitive exposure to EMOC training (81.7%) when compared to the 52.5% who thought a one-time workshop would be very useful and 13.6% felt it would not be very useful. This seems to resonate an expressed need for repetitive exposure to EMOC training in order for it to be effective in changing provider practices. In many ways, this may mark the need to apply principals for other emergency life saving courses taught in the United States such as basic and advance life support which require re-certification every 1-2
years and promote repetitive exposure to life saving protocols and knowledge. [18,19] It is also evident that most providers (89.3%) are enthusiastic about participating in short two-day workshops to improve their knowledge even if it was their day off. This lends some evidence that EMOC course like the Advanced Life Support in Obstetric maybe widely accepted by providers.
5. Recommendations

There is a significant need to improve the knowledge of providers in the delivery of Safe Motherhood services across the board with a specific focus on management of normal labor and obstetric complications. Increasing provider capacity and knowledge has to be viewed as an essential component of quality of care if improvements to maternal health outcomes are to be realized. Improving knowledge might be essential to improving providers’ confidence in managing obstetric emergencies as well. More focus and support for programs that improve EMOC training is needed for obstetric providers active in the health workforce. There are several EMOC training programs in circulation for use in the developing setting and range in terms of the information they provide and their duration. More work needs to be done to compare the quality and effectiveness of these various training programs in adequately imparting meaningful knowledge, skills competency, as well as improving retention over time. [20] It also maybe that education is not enough to impact provider practices. The addition of intermittent supervision in facilities to reinforce newly acquired knowledge by specialty trained Obstetricians and Gynecologist may need to be introduced as a part of the training model.

Critical components to be considered in any EMOC course include providing materials and lectures in a language most comfortable for students. Courses need to be no more than a few days because of the impact of not having providers in facilities when staff is gone for long periods. Courses need to be made available to all providers of obstetric services and not just an administrator who is then supposed to teach others at their facility. This will require creating and conducting courses that are cost-effective for widespread dissemination. Courses that reinforce practical skills are necessary because
essential EMOC care is highly procedure driven. Certification maybe a necessary component to validating a provider’s competency, along with intermittent refresher courses to foster strong knowledge and skills retention. Ideally systematic research on the various EMOC training courses capacity to meet these needs should be conducted before adopting any EMOC training program for widespread use.
6. Conclusion

The purpose of this study was to provide a quantitative and descriptive analysis of obstetric provider knowledge, attitudes and practices in delivery of basic Safe Motherhood services within the Bugesera District of Rwanda. In addition, it was an opportunity to evaluate how providers rate their own knowledge and confidence level with routine aspects of obstetric care, while exploring how providers envision improving their own knowledge and skills when delivering EMOC. Historically, the focus in developing countries for combating maternal and neonatal mortality and morbidity has been on structural issues, such as having access to facilities with the capacity to deliver care. The indicators of quality of care have revolved around the distance to facilities, running water in facilities, electricity, basic medications, and health personnel. Little attention has been paid toward looking at indicators of healthcare providers competency and practices when evaluating quality of care actually delivered. Yet, the quality of medical advice and intervention is integral in improving health outcomes.

The real value of these findings is the picture they paint of who the skilled obstetric providers are in Rwanda, their self-declared learning needs, present competency, expressed preferences and interests for improving their knowledge and skills. Due to the constraints of the population size of obstetric care providers in Bugesera and the fact that only one district was selected, this study remains underpowered to statistically determine correlations between how providers perceive their competency, their demonstrated knowledge competency and the whether their practices are reflective of the above. Nor was this study powered to look at to varying degrees of competency based on the level of provider training, their level of experience,
or the true impact of prior emergency obstetric care training. It is clear that the level of
knowledge providers presently have is low and that most providers feel that their
knowledge is lagging along with their confidence to carry out functions essential to
emergency obstetrics. It is also evident that providers admit to practices that are now
considered potentially harmful while having yet to adapt to other practices proven to be
beneficial. Most importantly, providers have expressed what they feel will help them
improve the quality of obstetric care to reduce maternal mortality giving us evidence for
focused training and certification of emergency obstetric care, with regular intervals of
refresher training. Filling the gaps in providers’ knowledge with quality training maybe
an essential intervention to address competency levels of providers. Future study is then
needed on measuring the impact of training on quality healthcare delivery and
subsequent health outcomes if we are to see the benefits of structural enhancements
being made during health systems strengthening.
Appendix A: English KAPS Survey for Obstetric Providers

KAPS Questionnaires for providers from: JHPIEGO. Guidelines for Assessment of Skilled Providers after training in maternal and newborn health. (p. 10-11, 20-23, 36-37, 46-47)

DEMOGRAPHIC INFORMATION:

Date: _______________________________

Age: _______________________________

Gender: ___M     ___F

Facility: ___Nyamata District Hospital     ___CHC: _______________________________

Title: ___MD     ___A1 Midwife     ___A1 Nurse     ___A2 Nurse     ___A3 Nurse
       ___Other: Specify ________________

1. How many years have you been providing obstetrical care?
   ___Months

2. How many hours/week do you spend providing obstetrical care?
   ___<5hrs     ___5-10hrs     ___10-20hrs     ___>20hrs

3. On average how many deliveries do you participate in monthly?
   ___0-5     ___5-10     ___10-20     ___20-30     ___>30
4. In the last year how many maternal deaths occurred at your facility?
   ___Deaths

5. Understanding that maternal deaths maybe unavoidable, how many deaths have you witnessed as provider in the last year?
   ___Deaths

6. In the last month how many postpartum hemorrhages have you managed as the primary obstetric provider?
   ___Number of postpartum hemorrhages

7. Please tell us how comfortable you are speaking, reading, and writing in the following languages.
   (0=not fluent, 5=completely fluent)
   a. Kinyarwanda  0  1  2  3  4  5
   b. French      0  1  2  3  4  5
   c. English    0  1  2  3  4  5

8. Did you ever receive education in emergency obstetrics during your health training?
   ___Yes   ___No
9. Have you ever taken a course in emergency obstetrics since being employed as a health provider?
   ___Yes    ___No

10. If yes, please tell us about the last course you took:
    a. Date taken: _______________________________
    b. Name of the course: _______________________________
    c. Which organization provided/sponsored the course: _______________________________
    d. Where was it taken: _______________________________
    e. How many contact hours did the course require? _______________________________

11. In helping to facilitate the vaginal delivery of the fetus what percent of the time do you administer fundal pressure? ___percent

12. How often do you transfer patients from your facility
    a. Never
    b. Very rarely
    c. Monthly
    d. Weekly
    e. Daily

13. How often do you obtain advice from a more senior provider either in person or via mobile phone
    a. Never
    b. Very rarely
    c. Monthly
d. Weekly

e. Daily

14. How often do you receive counter reference information on patients you have transferred?
___Never   ___Sometimes   ___Always

15. How often do you provide counter reference information on transferred patients referred to you?
___Never   ___Sometimes   ___Always

16. After delivering a singleton fetus while waiting for the placenta, what percent of the time do you do following:
   a. Administer Oxytocin: ___percent
   b. Provide cord traction: ___percent
   c. Uterine massage: ___percent
17. How often do the following negatively affect emergency obstetric care at your facility:

(1=never; 5=always)

- Knowledge in recognizing an emergency:
- Knowledge in appropriate management:
- Skills in delivering emergency care:
- Shortage of personnel:
- Availability of anti-hypertensive medications:
- Availability of magnesium sulfate:
- Availability of oxytocin:
- Availability of misoprostel:
- Availability of blood products:
- Timely transfer of patients to an equipped facility:

18. Please rate your knowledge in the following areas:

- Active management of third stage of labor:
- Postpartum hemorrhage:
- Preeclampsia and eclampsia:
- Puerperal infection:
- Shoulder dystocia:
- Partograms and labor management:
- Neonatal resuscitation:

19. Please rate your confidence in treating a patient with the following emergency:
• Postpartum hemorrhage:
• Shoulder dystocia:
• Sepsis:
• Eclampsia:
• Neonatal resuscitation:

20. How useful are the following educational activities for reducing maternal mortality in your environment: 
(1 = not useful, 5 = very useful)
• Providing reading material for independent study in emergency obstetrics:
  1  2  3  4  5
• Guest speakers who lecture on topics in emergency obstetrics:
  1  2  3  4  5
• Having posters in the facility outlining emergency procedures:
  1  2  3  4  5
• A one time workshop teaching and practicing skills in emergency obstetrics:
  1  2  3  4  5
• Annual workshops and certification trainings in emergency obstetrics:
  1  2  3  4  5
21. Please complete the following statement, “If a two day workshop in emergency obstetrics and neonatal resuscitation was offered I would attend________: 

a. Enthusiastically even if it was my day off."

b. Only if it counting as a regular work day."

c. Only if I was required by my facility." 

d. Without interest in the subject."
KNOWLEDGE QUESTIONS

Directions

Read the following questions and write an “X” on the line of the single best answer to each question.

ANTENATAL CARE KNOWLEDGE QUESTIONS

1. The information obtained from the antenatal history can help the provider:
   a. ___Plan for childbirth
   b. ___Identify existing problems
   c. ___Identify health education and counseling needs
   d. ___All of the above

2. Pregnant women should receive educational messages about which of the following?
   a. ___Personal hygiene, test, and exercise during pregnancy
   b. ___Diet and nutrition during pregnancy
   c. ___Danger signs during pregnancy
   d. ___All of the above

3. When counseling a pregnant woman about formulating a birth plan, the provider should tell her:
   a. ___If she has no risk factors, she can give birth at home with a traditional birth attendant
   b. ___There are ways of knowing whether she will develop a complication
   c. ___It is not recommended that she have a companion during labor and childbirth
   d. ___She should put money aside to pay for the expenses of the birth
4. If the woman trusts the provider and feels that he/she cares about the outcome of the pregnancy, she will be more likely to:

a. ___Return for scheduled antenatal care visits
b. ___Return immediately if a danger sign appears
c. ___Comply with recommended treatment
d. ___All of the above

5. When offering HIV testing services to a pregnant woman, the provider should:

a. ___Counsel the woman and let her decide whether to be tested
b. ___Ask the husband’s permission
c. ___Perform the test without informing the woman
d. ___Tell the woman she must have the test for her baby’s benefit

6. Focused antenatal care means that:

a. ___Care provided to every woman during pregnancy is for the purpose of providing
   support of the normal pregnancy as well as early detection and management of complications
b. ___A vaginal exam should be performed at every visit
c. ___All women have the same concerns about their pregnancies
d. ___Women don’t need information about danger signs in pregnancy

7. When counseling a pregnant woman about nutrition, be sure to:

a. ___Ask her what she eats in a typical day to determine if her diet is adequate
b. ___Tell her to eat the same amount of food that she ate before her pregnancy
c. ___Recommend that she weigh herself once a week
d. ___Inform her that only very anemic women need iron/folate supplements
8. Focused antenatal care includes which of the following actions?

a. ___Checking the baby's position at 28 weeks
b. ___Checking the woman's blood pressure at every visit
c. ___Assessing ankle edema at 36 weeks
d. ___Counseling the woman about danger signs only at the last visit

9. Tests that should be performed for every woman during antenatal care include:

a. ___Hemoglobin
b. ___Test for syphilis
c. ___Ultrasound of baby
d. ___A and B only

10. After giving a pregnant woman her first dose of tetanus toxoid by intramuscular injection, the used syringe and needle should be:

a. ___Decontaminated before placing in puncture-proof containers
b. ___Capped again before placing in puncture-proof containers
c. ___Decontaminated before reusing them
d. ___Placed in a garbage can
NORMAL LABOR, CHILDBIRTH, AND IMMEDIATE NEWBORN CARE KNOWLEDGE

QUESTIONS

Normal Labor and Childbirth Care

1. One way to prevent transmission of HIV from an infected mother to her baby (vertical transmission) is to:
   a. ___Use condoms
   b. ___Give AZT to the woman after the baby is born
   c. ___Rupture membranes early in labor
   d. ___Give a single dose of nevirapine to the woman in labor and to the baby after birth

2. When performing a vaginal examination, which of the following is recorded on the partograph?
   a. ___Cervical dilation of 3 centimeters
   b. ___Vaginal temperature and wetness
   c. ___Position of the presenting part
   d. ___Degree of molding

3. If a woman is admitted during the active phase of labor, cervical dilation is initially plotted on the partograph:
   a. ___To the left of the alert line
   b. ___To the right of the alert line
   c. ___On the alert line
   d. ___On the action line
4. Cervical dilation plotted to the right of the alert line indicates:
   a. ___Satisfactory progress in labor
   b. ___Unsatisfactory progress in labor
   c. ___The end of the latent phase
   d. ___The end of the active phase

5. Active management of the third stage of labor should be practiced:
   a. ___Only for women who have a history of postpartum hemorrhage
   b. ___Only for the primipara
   c. ___Only for the multipara
   d. ___For all women in labor

6. The appropriate order of steps in active management of the third stage of labor include:
   a. ___Controlled cord traction, fundal massage, and oxytocin
   b. ___Intravenous oxytocin, cord clamping and cutting, and fundal massage
   c. ___Cord clamping and cutting, controlled cord traction, ergometrine administration, and inspection to be sure the placenta is intact
   d. ___Intramuscular injection of oxytocin, controlled cord traction with counter-traction to the uterus, and uterine massage

7. If bleeding continues after delivery of the placenta using active management, the first thing the provider should do is call for help and:
   a. ___Start an IV
   b. ___Massage the uterus
   c. ___Insert a urinary catheter
   d. ___Check the placenta to make sure that it is completed
8. When Mrs. K. was admitted in labor at 10 AM the following were found: cervix: 5 cm; contractions: 3 in 10 minutes lasting 20-40 seconds; fetal head: 2/5 palpable; membranes intact; fetal heart rate: 138 beats per minute. At 2 PM the following were found: cervix: 7 cm; contractions: 2 in 10 minutes lasting 20 seconds; fetal head: 1/5 palpable; membranes intact; fetal heart rate: 142 beats per minute. Which is the most appropriate intervention?
   a. ___Prepare for vacuum extraction
   b. ___Encourage the mother to empty her bladder
   c. ___Sedate the mother so that she can rest
   d. ___Augment the labor with oxytocin

9. Which of the following will help to decrease the risk of infection during childbirth?
   a. ___Performing frequent vaginal examinations
   b. ___Rupturing membranes as soon as possible in the first stage of labor
   c. ___Routine catheterization of the bladder before childbirth
   d. ___Reducing prolonged labor

10. Contaminated instruments in the labor ward should immediately be:
    a. ___Washed with soap and water and boiled for 2 hours
    b. ___Soaked in 0.5% chlorine solution for 10 minutes
    c. ___Soaked in 0.5% chlorine solution for 30 minutes
    d. ___Washed with soap and water and soaked in 0.5% chlorine solution for 10 minutes
Immediate Newborn Care

1. The first step in thermal protection for the newborn includes:
   a. ___Drying the baby thoroughly immediately after birth
   b. ___Drying the baby thoroughly after the cord has been cut
   c. ___Covering the baby with a clean, dry cloth immediately after birth
   d. ___Covering the baby with a clean, dry cloth after the cord has been cut

2. Immediate care for a normal newborn includes:
   a. ___Skin-to-skin contact followed by placing the baby in a warming incubator
   b. ___Drying the baby, removing the wet cloth, and covering the baby with a clean, dry cloth
   c. ___Stimulating the baby by slapping the soles of the baby's feet
   d. ___Deep suctioning of the airway to remove mucus

3. Which of the following can contribute to hypothermia in newborns?
   a. ___The baby is not dried thoroughly immediately after birth
   b. ___The baby is bathed immediately after birth
   c. ___The baby is dried and placed in skin-to-skin contact with the mother
   d. ___A and B

4. To maintain the newborn's axillary temperature between 36.5° C and 37.5° C it is important to:
   a. ___Place the baby in an incubator
   b. ___Bathe the baby in warm water immediately after birth
   c. ___Rub the baby vigorously with a blanket
   d. ___Cover the baby's head, place the baby in skin-to-skin contact on the mother's chest, and cover with a blanket
5. Before performing an exam on a baby who is 2 hours old and who has not been bathed, the skilled provider should:
   a. ___Wash hands with soap and dry with a clean towel, then put on exam gloves
   b. ___Wash hands with soap and dry with a clean towel
   c. ___Bathe the baby with soap and water
   d. ___Put on sterile gloves

6. Care of the umbilicus should include:
   a. ___Cleansing with alcohol
   b. ___Covering with a sterile compress
   c. ___Cleansing with cooled, boiled water and leaving uncovered
   d. ___Applying antibiotic cream

7. The best way to determine if a newborn needs resuscitation is to:
   a. ___Wait until 1 minute after birth and assign the APGAR score
   b. ___Listen to the baby's heart rate
   c. ___Observe respirations immediately and begin resuscitation if they are less than 30/minute
   d. ___Perform resuscitation only if central cyanosis is present
8. Breastfeeding should begin:
   a. ___After the baby’s first bath
   b. ___When the baby starts to cry
   c. ___Within the first hour following birth
   d. ___When the mother’s milk comes in

9. When counseling the mother about breastfeeding, the skilled provider should tell her to:
   a. ___Avoid giving colostrum to the newborn
   b. ___Establish a schedule for breastfeeding so the baby gets plenty of sleep
   c. ___Give the baby water after each feed
   d. ___Breastfeed on demand for as long as the baby wants to feed

10. When counseling the mother about her newborn, the skilled provider should:
    a. ___Help the mother formulate a complication readiness plan for her baby
    b. ___Make sure the mother understands danger signs for her baby and where to go if they arise
    c. ___Tell the mother to bring her baby for a newborn care visit on the sixth day after birth
    d. ___All of the above
MANAGEMENT OF COMPLICATIONS KNOWLEDGE QUESTIONS

1. Carry out a rapid initial assessment:
   a. ___Only for women who present with abdominal pain and vaginal bleeding
   b. ___Only for women who present with abdominal pain
   c. ___Only for women who present with vaginal bleeding
   d. ___For all women of childbearing age who present with a danger sign

2. When there is an obstetric emergency, tell the woman and her family or support person:
   a. ___As much as possible about the management of the emergency
   b. ___As little as possible about the management of the emergency
   c. ___What the provider thinks she/they should be told
   d. ___Nothing at all

3. Immediate postpartum hemorrhage can be due to:
   a. ___Uterine atony
   b. ___Genital trauma
   c. ___Retained placenta
   d. ___All of the above

4. The most effective way to immediately control eclamptic convulsions is to:
   a. ___Give diazepam
   b. ___Give magnesium sulfate
   c. ___Deliver the baby as soon as possible
   d. ___Give nifedipine
5. Newborn resuscitation procedures:
   a. ___Always require the use of oxygen
   b. ___Should be started after assigning the APGAR score
   c. ___Can usually be carried out without oxygen
   d. ___Should only be carried out by a pediatrician

6. When performing newborn resuscitation with an Ambu bag and mask, it is important to verify that:
   a. ___The newborn's head is in neutral position
   b. ___The seal between the newborn's mouth, nose, and Ambu bag is adequate
   c. ___The baby is not covered
   d. ___Cardiac massage is being performed

7. Do not perform vacuum extraction in the case of:
   a. ___A cephalic presentation
   b. ___A face presentation
   c. ___Cervical dilation of 7 cm
   d. ___Fetal head not engaged

8. A woman with a ruptured uterus has which of the following signs and symptoms:
   a. ___Rapid maternal pulse
   b. ___Persistent abdominal pain and suprapubic tenderness
   c. ___Fetal distress
   d. ___All of the above
9. When performing newborn resuscitation with an Ambu bag and mask, ventilate at the rate of:
   a. ___20-30 breaths per minute if there is no chest in drawing
   b. ___40 breaths per minute for all babies
   c. ___60 breaths per minute if the baby is gasping
   d. ___None of the above

10. Treatment of postpartum endometritis includes:
    a. ___Discontinuation of breastfeeding
    b. ___Bed rest and adequate hydration
    c. ___Intravenous ampicillin, gentamicin, and metronidazole until fever-free for 48 hours
    d. ___B and C
POSTPARTUM CARE (MOTHER AND BABY) KNOWLEDGE QUESTIONS

1. During the first 2 hours following birth, the provider should:
   a. ___Measure the woman's blood pressure and pulse once, and insert a catheter to empty her bladder
   b. ___Measure the woman's blood pressure and pulse, and check the uterine tone every 15 minutes
   c. ___Not disturb the woman if asleep because her rest is more important than her vital signs
   d. ___Measure the woman's temperature and pulse, massage the uterus, and perform a vaginal examination to remove clots

2. After childbirth, the mother should have a postpartum visit with a skilled provider:
   a. ___Once, at 3 weeks postpartum
   b. ___Once, at 6 weeks postpartum
   c. ___Three times: at 6 hours, 6 days, and 6 weeks postpartum and any time she has danger signs
   d. ___Only if she has danger signs

3. During the postpartum visit to the clinic, obtain a history for the:
   a. ___Baby only
   b. ___Mother only
   c. ___Mother and baby
   d. ___Mother, her support person, and the baby
4. During each postpartum visit, specific information should be obtained from the woman about:
   a. ___Problems during pregnancy, during and after childbirth, and any present problems
   b. ___Present problems only
   c. ___Only those problems directly related to childbirth
   d. ___None of the above

5. By the tenth day postpartum, you should be able to palpate the uterus:
   a. ___Just below the umbilicus
   b. ___At the level of the umbilicus
   c. ___Just above the symphysis pubis
   d. ___Halfway between the symphysis pubis and the umbilicus

6. Each time you counsel the breastfeeding mother about nutrition, tell her that:
   a. ___There are many foods that she should avoid
   b. ___She should eat at least one extra meal per day
   c. ___She should only drink a few glasses of fluid per day
   d. ___Iron/folate supplementation is not necessary

7. At each postpartum visit, the mother should be counseled to seek care if she has which of the following danger signs:
   a. ___Normal lochia, temperature 37° C, or slight breast engorgement
   b. ___Edema of hands and face, severe abdominal pain, or sore, cracked nipples
   c. ___Severe headache, foul-smelling lochia, or calf tenderness
   d. ___B and C
8. When counseling a new mother about breastfeeding in the 6 hours following birth:
   a. ___Help her position her baby so that he/she attaches properly to the nipple
   b. ___Tell her to give breast milk substitutes so her baby will grow faster
   c. ___Advise that she breastfeed her baby 4 times/day
   d. ___Tell her that she needs a method of contraception even if she is exclusively breastfeeding

9. Each postpartum examination should include:
   a. ___Measurement of blood pressure and temperature, and assessment of conjunctiva, breasts, abdomen, perineum, and legs
   b. ___Observation of breastfeeding
   c. ___Information about contraception, safer sex, and counseling and testing for HIV
   d. ___All of the above

10. After completing the postpartum examination:
    a. ___There is no need to wipe off the exam table with 0.5% chlorine solution
    b. ___The exam table should be wiped off with 0.5% chlorine solution only if there is blood on it
    c. ___The exam table should be wiped off with 0.5% chlorine solution after each use
    d. ___The exam table should be wiped off with soap and water after each use
ATTITUDES AND PERCEPTIONS

Now I am going to read out a list of common perceptions about pregnancy, childbirth, and the period immediately after childbirth. There is no right or wrong answer to any of these questions. We are only interested in hearing you opinion.

1. A woman should plan ahead of time where she will give birth to her baby:
   a. ___Strongly agree
   b. ___Agree
   c. ___Disagree
   d. ___Strongly disagree
   e. ___Don’t know

2. A woman should plan ahead of time how she will get to the place where she will give birth:
   a. ___Strongly agree
   b. ___Agree
   c. ___Disagree
   d. ___Strongly disagree
   e. ___Don’t know

3. It is not necessary for a husband/partner to accompany his wife to antenatal care visits:
   a. ___Strongly agree
   b. ___Agree
   c. ___Disagree
   d. ___Strongly disagree
   e. ___Don’t know
4. When women do not go to a health facility to give birth, it is mainly because it is too expensive:

a. ___Strongly agree
b. ___Agree
c. ___Disagree
d. ___Strongly disagree
e. ___Don’t know

5. When women do not go to a health facility to give birth, it is mainly because it is too difficult to get there:

a. ___Strongly agree
b. ___Agree
c. ___Disagree
d. ___Strongly disagree
e. ___Don’t know

6. When women do not go to a health facility to give birth, it is mainly because the staff there do not treat women: respectfully

a. ___Strongly agree
b. ___Agree
c. ___Disagree
d. ___Strongly disagree
e. ___Don’t know
7. It is not necessary for a husband/partner to accompany his wife when she is giving birth:
   a. ___Strongly agree
   b. ___Agree
   c. ___Disagree
   d. ___Strongly disagree
   e. ___Don’t know

8. Giving birth is mostly a woman’s matter. Husbands/partners have little to contribute:
   a. ___Strongly agree
   b. ___Agree
   c. ___Disagree
   d. ___Strongly disagree
   e. ___Don’t know
Appendix B: Verbal Consent Form

Good morning/afternoon/evening. My name is _______________________________.
(Interviewer)

I represent Dr. Stephen Rulisa from CHUK.

Dr. Rulisa, with collaborators from Duke University in America are conducting survey study to determine the knowledge of specific issues related to mother and child health among obstetric providers in the Bugesera District. The survey seeks to identify obstetric providers attitudes towards the prevention and management of conditions causing maternal and neonatal mortality and to determine obstetric providers practices in addressing conditions causing maternal and neonatal mortality.

We are speaking with medical doctors, midwives and nurses providing obstetric care in Bugesera District Community Health Centers and Nyamata District Hospital about their experiences providing health services to women and their children during pregnancy, childbirth and the post-partum period. The results of this survey will be used to help improve health training programs for maternal providers.

You will be given a written survey to fill out but can refuse to answer any questions. You may end the survey at any time. You can also refuse to participate in the study entirely. The survey will require approximately 45 minutes to one hour of your time.

The information collected from you in this survey will remain confidential and will only be used for purposes of this study. There is no identifying information associated with your participation.
or responses to the survey. Interviewers will assign a unique identifier number, which will not allow anyone to identify you. No one at your place of employment will be able to link the results of your test with you personally and these results will not be reported to your supervisor or anyone with whom you work.

If you have any question about this study, you can contact our office in the Department of Clinical Research at Kigali University Teaching Hospital, Avenue de la Paix, Kigali MVK 655, (250) 575555.

May I provide you with a questionnaire? Yes/No

Name of interviewer _________________________

Date __________________________
Appendix C: Duke IRB Approval

DECLARATION OF EXEMPTION FROM IRB REVIEW

The DUHS IRB has determined that the following protocol meets the criteria for a declaration of exemption as described in 45 CFR 46.101(b)(2).

Protocol ID: Pro00025065
Protocol Title: Knowledge, Attitudes and Practices Towards Maternal and Neonatal Mortality Among Obstetric Care Providers in Bugesera District, Rwanda
Principal Investigator: Nathan Thielman

This Declaration of Exemption from IRB Review is in effect from 8/16/2010 and will remain in effect until 8/16/2013 (“Termination Date”). However, please be advised that any changes to the proposed research will require a re-application for exemption. If this protocol will be active by the Termination Date, please submit an application for renewal of the Declaration of Exemption to the DUHS IRB at least thirty (30) days prior to the Termination Date.

John Harrelson 8/16/2010
IRB Reviewer  Review Date
Works Cited


5. Rwanda Interim Demographic Health Survey 2007-2008, Ministry of Health of Rwanda, National Institute of Statistics Rwanda


10. Monographie Du District De Bugesera, Rebule De Rwanda Province de L’est District de Bugesera, 2006

11. Monographie Du District De Bugesera, Rebule De Rwanda Province de L’est District de Bugesera, 2006


15. Peabody, John W., Mario M. Taguiwalo, David A. Robalino, and Julio Frenk. 2006. “Improving the Quality of Care in Developing Countries.” In Disease Control Priorities in Developing Countries, 2d ed., edited by Dean T. Jamison and others. Washington: World Bank

16. Schneider P, Diop F. “Community-Based Health Insurance in Rwanda.” 2004, chap 7 in Health Financing for Poor People. IBRD / World Bank


