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MCHIP Maternal and Child Health Integrated Program

Quality of Care for Prevention and Management of Common Maternal and Newborn Complications

Findings from a National Health Facility Survey in Rwanda

Fidele Ngabo
Jérémie Zoungrana
Ousmane Faye
Barbara Rawlins
Heather Rosen
Rebecca Levine
Reena Sethi
Juliet MacDowell
Sharon Arscott-Mills
Paulin Basinga

Authors:
Fidele Ngabo, MD, MPH, MOH/Rwanda
Jérémie Zoungrana, MSc, Jhpiego/MCHIP
Ousmane Faye, MD, MPH, Jhpiego/MCHIP
Barbara Rawlins, MPH, Jhpiego
Heather Rosen, MPP, Johns Hopkins University Institute for International Programs
Rebecca Levine, MPH, Save the Children
Reena Sethi, MHS, Jhpiego
Juliet MacDowell, MPH, Jhpiego
Sharon Arscott-Mills, MPH, ICF International
Paulin Basinga, MD, MSc, PhD, School of Public Health, National University of Rwanda

The Maternal and Child Health Integrated Program (MCHIP) is the USAID Bureau for Global Health flagship maternal, neonatal and child health (MNCH) program. MCHIP supports programming in maternal, newborn and child health, immunization, family planning, malaria, nutrition and HIV/AIDS, and strongly encourages opportunities for integration. Cross-cutting technical areas include water, sanitation, hygiene, urban health and health systems strengthening.

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Abbreviations and Acronyms

AMTSL	Active management of the third stage of labor
ANC	Antenatal care
BEmONC	Basic emergency obstetric and newborn care
CEmONC	Comprehensive emergency obstetric and newborn care
CCT	Controlled cord traction
DHS	Demographic and Health Survey
EDL	Essential drug list
EmONC	Emergency obstetric and newborn care
ENC	Essential newborn care
FIGO	International Federation of Gynecology and Obstetrics
HMIS	Health management information system
HW	Health worker
ICM	International Conference Confederation of Midwives
IM	Intramuscular
IP	Infection prevention
IU	International units
IV	Intravenous
JHSPH	Johns Hopkins Bloomberg School of Public Health
MCHIP	Maternal and Child Health Integrated Program
MOH	Ministry of health
PBF	Performance-based financing
PE/E	Pre-eclampsia/eclampsia
PMTCT	Prevention of mother-to-child transmission of HIV/AIDS
PPH	Postpartum hemorrhage
SDGs	Service delivery guidelines
SPA	Service Provision Assessment
USAID	United States Agency for International Development
WHO	World Health Organization

Foreword

The Government of Rwanda and the Ministry of Health, with help from all development partners, has not spared any efforts to strengthen the health sector in Rwanda—especially maternal and child health—by implementing evidence-based interventions for the purpose of meeting the Millennium Development Goals in 2015 and the Government Vision 2020.

In the past few years, the Government of Rwanda has identified and implemented evidence-based interventions to reduce maternal and newborn mortality, namely quality prenatal care, delivery assisted by a skilled attendant, active management of the third stage of labor, and others interventions.

Rwanda has also successfully scaled up access to health insurance to resolve population-level barriers to the use of maternal health services, leading to an increased use of health services.

Even though the coverage of those key interventions has significantly increased, the challenge is now on the quality of care produced. It is only the quality of services which will allow us to make an impact on maternal and neonatal mortality in the long run.

The present report come in a timely manner and it addresses critical questions using a state of art methodology. The Maternal and Child Health unit will make this document a reference tool as the Ministry strives to increase access to and quality of maternal and neonatal care to a level that satisfy the priority health care needs of all Rwandese.

The results and recommendations from the present study will help the Ministry of Health to develop a policy to increase the quality of maternal and neonatal health so that Rwanda can progress toward achieving the Millennium Development Goals.

The Government of Rwanda and the Ministry of Health would like to thank Sharon Arscott-Mills (Fellow-International Health) and BASINGA Paulin (NUR- School of Public Health) for their work on the analysis and writing of this report. Thanks also to all heads of health centers, hospital directors and medical personnel for their active participation in the survey.

Special thanks go to the members of the Maternal and Child Health Technical Working Group for their valuable comments during the course of the study implementation and for validating the results.

Hon. Minister of Health
Dr. Binagwaho Agnes

Executive Summary

The Rwanda Quality of Care for Prevention and Management of Common Maternal and Newborn Complications Assessment was conducted as part of a larger multi-country study. As of 2012, surveys have been completed in Ethiopia, Kenya, Madagascar, Rwanda, Tanzania and Zanzibar, and are ongoing in Mozambique and Zimbabwe. The studies aim to determine the frequency and quality of interventions that address common direct causes of maternal and newborn deaths in developing countries, compared to the globally accepted, evidence-based guidelines delineated in the World Health Organization's manual, *Managing Complications in Pregnancy and Childbirth,* which is part of the *Integrated Management of Pregnancy and Childbirth* (IMPAC) series.

The purpose of the survey is to generate information to quantify the need for and guide the content of quality improvement activities for maternal and newborn care at facility, district, and national levels through documentation of the appropriate use, quality of implementation, and barriers to performance of key preventive, screening and treatment interventions during facility-based maternal and newborn care. The ultimate aim is to contribute to reduction of frequent, preventable maternal and newborn deaths through increased use and quality of known life-saving interventions.

This study augments the existing literature on maternal and newborn health by including both knowledge tests and direct observation of care against standard checklists in both antenatal care (ANC) and labor and delivery (L&D) care, rather than collecting data through routine household surveys. This study is being conducted in multiple countries either as a standalone survey or as part of other survey efforts, such as the Service Provision Assessment (SPA). In Rwanda, a module addressing post-abortion care was included in the study; results from this portion of the assessment are available in a separate report.

The study was conducted in 72 health facilities, with observation of close to 300 deliveries and 300 ANC consultations. Overall, the study found the quality of services provided to ANC and L&D clients for the prevention, early detection and treatment of common maternal and newborn health complications was mixed. However, care was frequently below the standards recommended in the WHO's IMPAC manual of evidence-based protocols and guidelines.

High adherence to standards was observed in some initial assessment tasks for L&D, initiation of partograph, several key infection prevention (IP) practices, correct use of uterotonics during the third stage of labor as part of active management of the third stage of labor (AMTSL), blood pressure screening for pre-eclampsia, immediate drying of newborns and dry cord care as components of essential newborn care. More than three-quarters of health workers reported being supervised in the last three months, and two-thirds of health workers counseled women about their HIV status during ANC visits.

In contrast, essential drugs and supplies were not available in all facilities assessed; 43% lacked all needed supplies for normal delivery on the day of the assessment, and cord ties or clamps were missing in most facilities. Health worker aggregate knowledge scores on maternal sepsis, obstructed labor, pre-eclampsia/eclampsia (PE/E) and postpartum hemorrhage (PPH) ranged from 34% to 43%. Health promotion during ANC was infrequently observed, with a score of 14%.

The proper use of AMTSL to prevent postpartum hemorrhage was infrequent, with all elements performed correctly at just 7% of observed births. Errors were found in the timing of administration of the uterotonic, as well failure to perform both controlled cord traction and uterine massage. Knowledge scores for diagnosis and management of PPH were low, with an

overall score of 40%. Knowledge scores on actions to take for bleeding associated with an atonic uterus (39%) and bleeding due to retained placenta (34%) were also low. Given that PPH is the most frequent cause of maternal death around the world, these scores are cause for concern. Magnesium sulfate is the recommended drug of choice for the treatment of PE/E in Rwanda, but only 43% of facilities had the drug in stock. History taking for PE/E danger signs was minimal in both ANC and L&D.

Several aspects of immediate newborn care were performed more poorly than expected, including the provision of skin-to-skin contact and initiation of breastfeeding within an hour after birth. Although adherence to standard IP practices was moderate (62%), providers rarely demonstrated the simplest and most basic IP behaviors. Hand washing was rarely performed before initial (11%) or subsequent assessments (10%) and was observed after less than 60% of deliveries.

Recommendations to improve the quality of maternal and newborn health services in Rwanda have been made based on the survey findings. Recommendations were developed to address the many facets of the health system involved in the delivery of quality care, including policies and guidelines; capacity building and training; drug and supply chain logistics; monitoring and evaluation; improved prevention and treatment of routine complications; and cross-cutting themes. A complete list of recommendations can be found in Section 8 of this report.

The results of this assessment will be used to guide the Maternal and Child Health unit of the Rwanda Ministry of Health in strengthening their programs and policies to improve the quality of antenatal care and labor and delivery services. The results will also serve as baseline estimates in the evaluation of quality improvement activities.

1. Background

Improving the quality of obstetric care in facilities has recently been identified as a neglected and essential approach to reducing maternal deaths and enabling developing countries to achieve Millennium Development Goal (MDG) 4 and 5 (Van den Broek and Graham 2009). This quality of care assessment builds on the successful model of the AMTSL survey developed by the Prevention of Postpartum Hemorrhage Initiative (POPPHI) (Stanton et al. 2009; Khan et al. 2006). The results from that survey proved highly successful in motivating policy and supporting program efforts to increase AMTSL and reduce PPH in the ten countries where it was conducted.

Postpartum hemorrhage is the most frequent cause of maternal deaths globally and in developing countries, accounting for 25% of maternal deaths. Next are hypertensive disorders in pregnancy (PE/E) at 15%, sepsis (8%) and obstructed labor (7%) (Khan et al. 2006). An analysis based on data from 2000 found that approximately half of all births in developing countries took place in facilities (Stanton, Blanc, Croft and Choi 2007). The most recent Rwanda Demographic and Health Survey (RDHS), conducted in 2010, estimated that 69% of deliveries occur in a health facility and are attended by a skilled provider (NISR, MOH, and ICF International 2012).

Effective interventions exist for screening, preventing and treating obstetric and newborn complications, and they can be readily provided by skilled providers in facilities. However, achieving both high quality and coverage of these interventions is essential in order to reduce maternal and newborn deaths globally and support countries in meeting their MDG 4 and 5 targets. In Rwanda, pregnancy and childbirth complications are among the leading causes of mortality, with the RDHS estimating the maternal mortality ratio at 476 maternal deaths per 100,000 live births and a neonatal mortality rate of 28 per 1000 live births (NISR, MOH, and ICF International 2012).

Two major survey efforts have been undertaken to assess the quality of care in health facilities in the developing world. Columbia University's Averting Maternal Deaths and Disabilities (AMDD) Program, in partnership with the United Nations (UN) and the United Nations Children's Fund (UNICEF), developed an obstetric facility assessment. ICF International developed the Service Provision Assessment (SPA) survey, which has been applied in a number of countries. Both of these instruments assess aspects of facility readiness related to provision of quality maternal care, including number and type of health providers and availability of equipment and medical supplies. However, there has been a gap in understanding the specific and systemic weaknesses in the management of maternal complications that lead to morbidity and mortality.

The Maternal and Child Health Integrated Program (MCHIP) first decided to develop this survey to assess PE/E treatment. Realizing that there is a need to assess broader issues related to quality of maternal health care, MCHIP decided to expand the survey to include all labor and delivery (L&D) practices. The survey expands on previous studies of maternal and newborn health through the inclusion of a knowledge test to assess understanding of evidence-based interventions for common complications and direct observations of care using standardized during both ANC and L&D care. This survey is being conducted in multiple countries as a standalone survey, or incorporated into other survey efforts, such as the SPA.

The purpose of the survey is to generate information to quantify the need for and guide the content of quality improvement activities for maternal and newborn care at facility, district, and national levels through documentation of the appropriate use, quality of implementation, and

barriers to performance of key preventive, screening and treatment interventions during facility-based maternal and newborn care. The definition of "quality" as applied to the practices assessed is that they are correctly carried out based on globally accepted, evidence-based guidelines. The ultimate aim is to contribute to the reduction of frequent, preventable maternal and newborn deaths through increased use and quality of known life-saving interventions.

2. Study Objectives

This assessment in Rwanda is part of a larger multi-country study to determine the frequency and quality of interventions that address common direct causes of maternal and newborn deaths in developing countries, using globally accepted, evidence-based guidelines delineated in the World Health Organization's manual, *Managing Complications in Pregnancy and Childbirth,* which is part of the *Integrated Management of Pregnancy and Childbirth* (IMPAC) series (WHO 2003).

For pregnant women, these complications include PE/E, PPH, prolonged/obstructed labor and sepsis; for newborns, the main complication is birth asphyxia. The obstetric and neonatal care interventions assessed include screening and management of PE/E, use of AMTSL, use of the partograph, treatment of PPH, infection prevention, and essential newborn care and resuscitation.

Secondary study objectives include the following:

- Provide baseline estimates on compliance with globally accepted standards for clinical practice in ANC and L&D. The interventions assessed include prenatal history taking and birth preparedness counseling; screening, prevention, and point estimates of treatment of severe PE/E and PPH; prevention of PPH through the use of AMTSL; prevention and management of prolonged/obstructed labor through the use of the partograph; prevention of puerperal sepsis through IP practices; and immediate essential newborn care practices.
- Provide qualitative information on the quality of management of PE/E, PPH and newborns with asphyxia.
- Assess three sets of factors related to quality of care:
  - Health provider knowledge of evidence-based practices
  - Facility readiness to provide care with respect to infrastructure, supplies and medications
  - The national policy environment
- Develop indicators and data collection tools for use in multiple countries.

The results of this assessment will be used to guide the Maternal and Child Health Unit of the Rwanda Ministry of Health (MOH) in strengthening their programs and policies for improving the quality of antenatal care and labor and delivery services. The results will also serve as baseline estimates in the evaluation of quality improvement activities.

3. Methodology

3.1 STUDY DESIGN

This was a cross-sectional national facility survey that is part of a multi-country study to assess the quality of maternal and newborn care practices at health facilities. The other countries in the study are Ethiopia, Kenya, Tanzania, Rwanda, Madagascar, Mozambique, and Zimbabwe.

3.2 DATA COLLECTION TOOLS

The following tools were developed for this assessment:

- **Structured clinical observation checklists for ANC consultations and care of women in labor.** A set of concise, structured clinical observation checklists was used for observation of ANC consultations and vaginal deliveries in selected facilities. The content of the checklists is based on the World Health Organization's IMPAC manual and guidelines for screening for PE/E in ANC and L&D; management of PE/E and PPH; routine and correct use of the partograph; routine and correct use of AMTSL; IP behaviors; provider-client interaction/communication; correct essential newborn care and newborn resuscitation. Client background information collected includes age, gravidity, and parity. The tool also captured the qualifications of the provider and level of care provided by the health facility (tertiary care, hospital, health center, etc.). The forms are adapted from the Jhpiego ACCESS Program's *Best Practices in Maternal and Newborn Care: Learning Resource Package on Best Practices in Maternal and Newborn Care* (ACCESS 2008). The routine labor and delivery clinical observation checklist was adapted from the instrument used by POPPHI in their survey on AMTSL.

- **Health care worker interviews, including both quantitative and qualitative components.** The first section of the tool collects information from health workers on clinical qualifications; training and experience providing ANC, L&D, and newborn care services; and supervision. The second half of the tool is composed of questions that test the provider's knowledge on how to identify, manage, and treat common maternal and newborn health complications, including obstructed labor, PPH and sepsis. A clinical case study was used to assess provider knowledge and clinical decision-making pertaining to management of severe PE/E and newborn resuscitation skills were assessed through a simulation. When possible, health workers who were observed providing ANC or L&D services also completed the health worker interview.

- **Record review.** This tool captured the number of ANC consults, deliveries, births, deaths and obstetric complications at each facility for the last year from locally maintained registries. The design of the tool was informed by the AMDD tool (AMDD 2010). In addition, up to 24 individual patient charts from the previous three months were reviewed for partograph use, AMTSL, and essential newborn care.

- **Facility inventory.** The facility inventory tool assesses infrastructure conditions and verifies the availability of and storage conditions for medications, supplies and equipment. The inventory was conducted once per facility and could include interviews with different health workers for the various sections of the tool to ensure the most accurate responses. Through an interview with the head of the health facility or their designee, a listing was generated of all health workers who attend deliveries and/or provide ANC care.

- **National policy and drug review.** A standardized questionnaire was completed based on a visit to the national drug depot and key informant interviews to identify relevant evidence-based practice guidelines in national policies; relevant medications on the national essential drug list or formularies; evidence-based content on L&D care, including PE/E treatment, in pre-service and in-service medical curricula/syllabi from the year preceding the study; and

background statistics on maternal and newborn health (e.g., mortality) from existing sources such as the Demographic and Health Survey (DHS) and Health Information Systems (HIS).

3.3 SAMPLE

The goal for the global study was to observe at least 250 deliveries and 250 ANC consults in each country. In each country, the Ministry of Health and MCHIP collaboratively decided whether to conduct a census of facilities, draw a random sample, focus on high-volume facilities, or use a combination of selection methods, depending on the total number of facilities, the number of facilities at each level (district hospital, hospital, health center, dispensary/health post), the average number of deliveries per day per facility, and logistical requirements. In Rwanda, the team planned to visit all district hospitals (40 of 40, including one military hospital that serves the general population), all referral/pre-service facilities (three of three), and one randomly selected health center per district (total of 30). One of the referral hospitals was excluded from the final sample because they required approval by an in-house ethics board, and this would have caused delays. The number of planned health worker interviews, deliveries and ANC consultations shown below reflect the decision made during data collector training to revise targets downward to more accurately reflect the situation on the ground. Among the 72 facilities visited, the majority were public (63%), about a third were religiously affiliated, and one facility was military.

Table 3.1 Health facility sample, health workers interviewed, and ANC and L&D observations

SAMPLE	PLANNED	ACTUAL SAMPLE*
Health facilities	73 total 40 district hospitals 3 referral/pre-service hospitals 30 randomly selected health centers (one per administrative district)	72 total 40 district hospitals 2 referral/pre-service hospitals 30 randomly selected health centers (one per administrative district)
Health provider interviews	Minimum of 2 providers per facility, for total of 146	146 total interviews from 71 facilities
Deliveries observed	5 deliveries per hospital and 3 deliveries per health center, for a total of 305 deliveries	293 deliveries observed at 64 facilities
ANC consults observed	5 ANC consults per facility, for total of 365	311 ANC consults observed at 54 facilities

* At some facilities there were either no deliveries or no ANC consults to observe, or one of these services was not provided. Therefore, the number of facilities in each sample differs from the overall 72 facilities visited (see Appendix Table A for information on which facilities had deliveries observed).

Close to 300 deliveries were observed during the survey (Table 3.2). The number of observations is different at each stage of labor and delivery because sometimes patients arrived in later stages of labor or the data collector had to step away and missed some activity. Table 3.3 shows the number of complications observed. There were 44 cases of asphyxia, four postpartum hemorrhages, 12 newborn deaths, and one maternal death observed during the survey.

Table 3.2 Components of L&D observed

COMPONENTS OF L&D OBSERVED	NUMBER OF CASES
Initial client assessment	187
First stage of labor	241
Second and third stage of labor	225
Immediate newborn and postpartum care	225
Total number of L&D observations	293

Table 3.3 L&D complications and negative outcomes observed

L&D COMPLICATIONS	NUMBER OF CASES
Postpartum hemorrhage	4
Pre-eclampsia/eclampsia	0
Neonatal asphyxia	44
Death of newborn	12
Death of mother	1

Facility weights were used to adjust the results from labor and delivery observations when the number of cases during the observation period at a given facility differed from the expected case load (Appendix Table A). The expected number of observations per day for each facility was calculated based on data collected with the record review tool. When the number of cases at a given health facility fell below that estimate, the results were adjusted upward. If more deliveries were observed than had been expected, based on the daily rate for that facility, the results were adjusted down. Only data from the labor and delivery observation tool were weighted; the results of the antenatal care observations, health worker knowledge tests and facility inventory were used as collected. Observations of maternal and newborn complications (PE/E, PPH and newborn resuscitation) were not weighted because data were only used qualitatively.

3.4 DATA COLLECTION PROCEDURES

A group of 19 skilled providers (medical doctors and nurses) were trained as data collectors for the survey during a 14-day training session (August 23 to October 3, 2010) in Kigali, Rwanda. The training included briefings on the background and rationale of the study, a description of the research tools, and technical instructions on using a Windows Mobile/HTC smartphone for data collection. The trainees also had an opportunity to go to the field and practice using the smartphones for data collection. Their clinical observations skills were standardized before the data collector training session.

Although 19 data collectors were trained, one dropped out after the training, so the total number of workers in the field was 18. Data collectors worked in six teams of three, with one person acting as team leader and taking responsibility for logistics. Each team spent two to three days at each facility, depending on the availability of cases. The team arrived at each facility early enough to attend the morning staff meeting and explain the process of the study. Data collection was conducted from September 6 to October 22, 2010.

3.5 DATA ANALYSIS

Survey data was recorded by data collectors on smartphones using custom-created data entry programs developed with the PocketPC Creations software package running on a Windows mobile platform. Logic, skip and consistency checks were built into the programs. Data

collectors were trained to review records for missing or inconsistent answers before submission. Depending on local capabilities, the data from each handheld device was either uploaded directly to a central database at the end of each day or backed up to a secure digital card to be uploaded when the data collectors returned from the field. At the end of the data collection period, all of the data files from all eight teams were linked and merged into a central database. After data cleaning, the MCHIP team in Washington, DC generated a standard set of online tables and graphs using a custom-designed ColdFusion backend. Additional analysis was carried out using SPSS software for variables that were not included in the program used to generate the standard sets of online tables.

3.6 ETHICAL CLEARANCE

The Rwanda study protocol was submitted to and approved by the Rwanda National Ethical Committee (RNEC) and the Institutional Review Board (IRB) of Johns Hopkins Bloomberg School of Public Health (JHSPH). The JHSPH IRB ruled the protocol exempt from review under 45 CFR 46.101(b), Category (5). Informed written consent was obtained from all participating health providers, heads of health facilities, and patients. All informed consent forms were translated in Kinyarwanda as requested by the RNEC. During the Ethiopia pilot testing, we realized that women may come in with obstetric complications and are either too ill, such that they are mentally incapacitated, or are unconscious and unable to give consent. Because these cases are very important in our assessment of quality of care, we received approval to obtain consent from the next of kin in these circumstances.

3.7 LIMITATIONS

There are several important limitations that should be noted. First, although the study sample was national in scope, the selection of the sample included only one health center per district, not a nationally representative sample of health centers. Thus, study findings for health centers can only be generalized to that group of facilities, not all lower-level facilities that provide delivery care services. Second, although the study achieved a total sample size of 293 labor and delivery cases, not all stages of labor and birth were observed for each individual case. The sample of cases by stage of labor was smaller than the total number of cases observed. This means that we did not achieve the desired statistical power for the indicators associated with the observed care of normal birth. Third, the data collectors reported some difficulties in using the time function button in the smartphone applications. Thus, the reliability of some of the observed clinical care indicators, which were calculated based on time of performance, is not as high as desired. Finally, the data collected on the performance of signal functions at each facility in the previous three months is based on health care worker/supervisor verbal reports and is subject to recall error. This information was not verified using the facility records because performance of some signal functions (e.g., manual removal of placenta and provision of parenteral anticonvulsants) is only recorded in clients' charts. Because these treatments are rarely provided, it would be necessary to do an extensive chart review to verify if these services were provided in the previous three-month period. Such a review was beyond the scope of the current study protocol.

As a general note, this was the first time most of the interviewers had collected data using a smartphone-based system. Despite the extensive training provided to the data collectors, there were some misunderstandings. For example, during the provider knowledge assessments, some interviewers left responses blank to indicate that the provider did not know the response to the question asked. The smartphones were sometimes defective and would not allow the data collectors to save a record and send it later; as a result, there were some reported cases of data being lost. When this happened, interviewers had to look for the same respondent and conduct the interview a second time, if possible.

Finally, because this is a cross-country assessment, some questions were not applicable in the Rwandan health system, but they were kept in the survey anyway.

4. Facility Readiness

The ability to deliver quality maternal and newborn care at the facility level is dependent on several key factors being present at the same time and in the same place. These factors include adequate numbers of skilled, trained and knowledgeable health providers, a functioning supervisory structure, sufficient infrastructure, functioning equipment and an adequate stock of medicines and other supplies. This section reviews the requisite components for the provision of care at the facilities assessed in Rwanda.

4.1 PRESENCE OF NATIONAL POLICIES AND GUIDELINES

As part of the Rwanda policy and drug review, the essential drug list was received from the national pharmaceutical storage (CAMERWA) and national guidelines and policy documents were collected from the Maternal and Child Health Unit of the Ministry of Health. Supporting survey data is incorporated when available. Table 4.1 summarizes the results of the analysis of the policy environment.

Table 4.1 Maternal and newborn care practices in national guidelines and policy documents

CONTENT AREA	FINDINGS
Postpartum hemorrhage	Clearly included in the service delivery guidelines (SDGs). The diagnostics and treatment are standardized. Oxytocin (first line), ergometrine and misoprostol are all registered, included in the national essential drug list (EDL), and procured by the national drug warehouse. The drugs are available in recommended units/forms and the dosages for postpartum hemorrhage are mentioned in the service delivery guidelines (SDGs).
AMTSL	All recommended practices for AMTSL (oxytocin at dose of 10 IU, controlled cord traction and uterine massage) are included in the standard treatment guidelines approved by the Ministry of Health. AMTSL can be practiced by nurses, midwives and doctors working in health facilities with functioning maternity services.
Severe PE/E	Screening for PE/E during L&D care is promoted in the SDGs, and magnesium sulfate is proposed as the first-line drug for treatment of severe PE/E at a dose of 4g with 20% concentration IV over 5 minutes. It is also first-line treatment in the national/standard drug list. Magnesium sulfate is registered, is on the EDL, and can be administered by nurses, midwives and doctors working in health facilities with functioning maternity services.
Partograph	The use of the partograph during L&D care is specifically promoted in the national-level SDGs. The evaluation of quality as part of the performance-based financing (PBF) evaluation scheme also includes partograph evaluation. During the site visits, 99% of facilities had blank partographs available.
Immediate and essential newborn care	There are validated newborn resuscitation guidelines and resuscitation is included in the pre- and in-service training offered to nurses and midwives as well as medical doctors.

4.2 PRESENCE OF SKILLED PERSONNEL

According to staffing schedules, 88% of facilities had 24-hour coverage for deliveries by having staff either present or on call. Table 4.2 shows the composition of the workforce observed providing ANC and L&D services and interviewed in the health facilities assessed. The majority of respondents in all samples were midwives and nurses. Twenty-four percent of ANC consults were conducted by physicians, but very few physicians conducted deliveries. The distribution of male and female providers reflects the fact that midwives and nurses are more likely to be women; two-thirds of the providers who provided antenatal care and the majority (90%) of those who assisted delivery were women. The majority of health workers interviewed and given the knowledge test were nurses and midwives (86%); medical doctors represented only 13%. Interviewees were typically less than 40 years old (78%) with less than 10 years of experience (88%); over half of the providers interviewed had less than 5 years' experience.

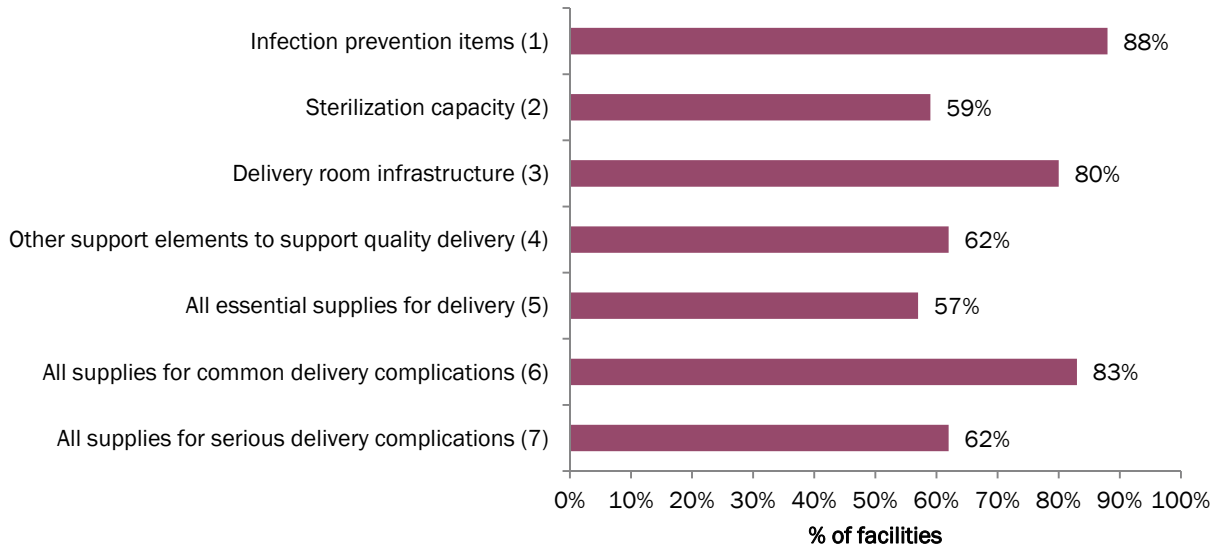
Table 4.2 Percentage of ANC consults, deliveries and interviews, by health worker qualification

HEALTH WORKER (HW) QUALIFICATION	PERCENTAGE OF ANC CONSULTS (n=311)	PERCENTAGE OF DELIVERIES (n=293)	PERCENTAGE OF HW INTERVIEWS (n=146)
Physician	24%	2%	13%
Midwife/nurse	74%	89%	86%
Health assistant	1%	1%	0%
Others (students, others, missing)	1%	6.4% (students = 4.4%)	1%

4.3 AVAILABILITY OF ESSENTIAL MEDICINES AND SUPPLIES

Figure 4.1 shows the availability of essential maternal and newborn medicines and supplies across the different health facilities. These categories and calculations are adapted from ICF International's Service Provision Assessment. Each bar is a composite value calculated as follows:

Figure 4.1 Availability of essential maternal and newborn supplies and medicines in the delivery room



[1] Mean percentage for soap and piped water/bucket with tap, sharps container, already mixed decontaminating solution, clean (or sterile) gloves; also see Appendix Table B
[2] Mean percentage for functioning electric or non-electric equipment for sterilization (electric autoclave, or electric dry heat sterilizer, or electric boiler or steamer, or non-electric pot with cover and heat source), functioning automatic timer or TST indicator strips, written protocols or guidelines for sterilization or disinfection; also see Appendix Table C
[3] Mean percentage for private room with visual and auditory privacy, functioning spotlight for pelvic exam (or flashlight/torch or exam light), table or bed for delivery
[4] Mean percentage for 24-hour coverage for deliveries, guidelines for normal delivery, guidelines for emergency obstetric care, blank partographs
[5] All items: sterile scissors or blade, disposable cord ties or clamps, suction apparatus for use with catheter, and skin antiseptic
[6] All items: syringes and needles, injectable oxytocic (oxytocin or ergometrine), IV infusion set, suture material with needle, and needle holder
[7] All items: injectable anticonvulsant (magnesium sulfate or diazepam) and injectable antibiotic (ampicillin or gentamycin)

The necessary inventory and infrastructure for IP were present in close to 90% of the institutions surveyed, with soap the main limiting factor (present in the delivery room of only 77% of facilities). The score for full sterilization capacity was only 59%. However, this score was influenced by the very low percentage of facilities with written guidelines of sterilization (19% of facilities). More than 90% of facilities had some type of functioning sterilization equipment. All essential supplies for delivery were available in only half of facilities; within that category, disposable cord ties were often missing (54% of facilities). Over 80% of facilities were fully equipped to manage common complications of delivery, a very positive result given that these complications occur most frequently.

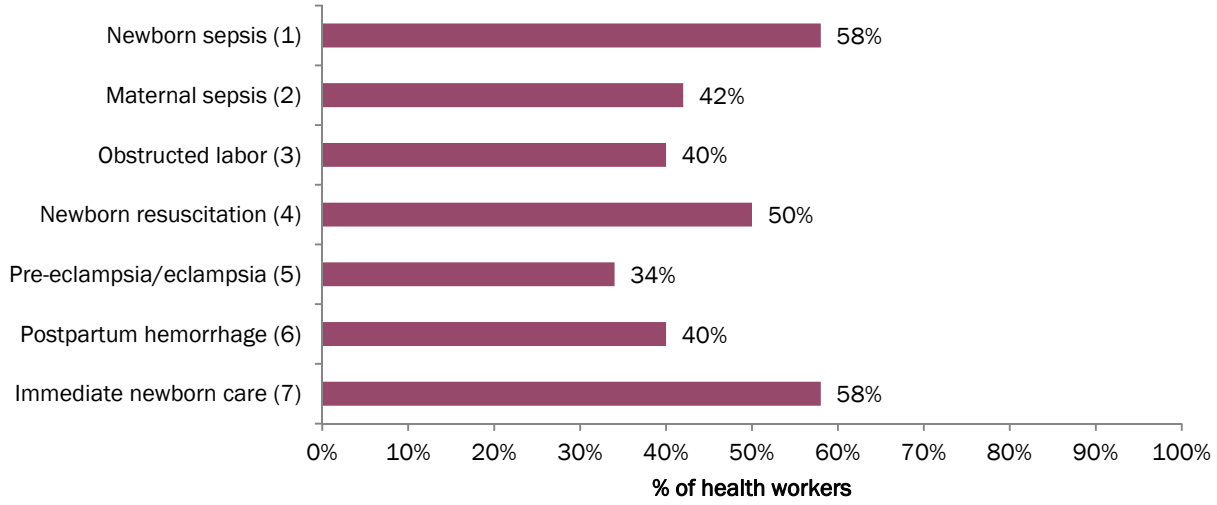
Given the focus on PPH, PE/E and newborn asphyxia in this assessment, it is important to note that 80% of facilities had either magnesium sulfate or diazepam available and 88% had an injectable oxytocic. Thus, availability of supplies for these two important and more frequent complications appears to be reasonably widespread. However, during the survey period, only 43% of facilities (n=68) had magnesium sulfate, the drug of choice for managing PE/E. Since a significant proportion of women in Rwanda still give birth at home, the availability of misoprostol is also important. A new research study will soon be implemented to take advantage of the well-developed network of community health workers in the country to initiate effective postpartum hemorrhage protection using misoprostol. Only 19% of facilities had misoprostol available, 27% of hospitals and 7% of health centers.

4.4 HEALTH WORKER KNOWLEDGE OF MANAGEMENT OF OBSTETRIC AND NEWBORN COMPLICATIONS

This study used multiple choice questions, a clinical case study on PE/E, and a simulation of newborn resuscitation to assess health provider knowledge of the prevention, identification and management of common obstetric and newborn complications. Since each question had multiple correct answers, mean scores were calculated by averaging the percentage of health workers who gave each of the possible correct answers to a question. It is usually assumed, but not always correctly, that health worker knowledge is strongly correlated with or can predict correct performance of clinical skills (Harvey et al. 2007).

In general, the level of knowledge about maternal complications was low across respondents. The highest mean scores achieved were for management of newborn sepsis and immediate newborn care (both 58%). The lowest knowledge scores were in the recognition and management of PE/E (34%).

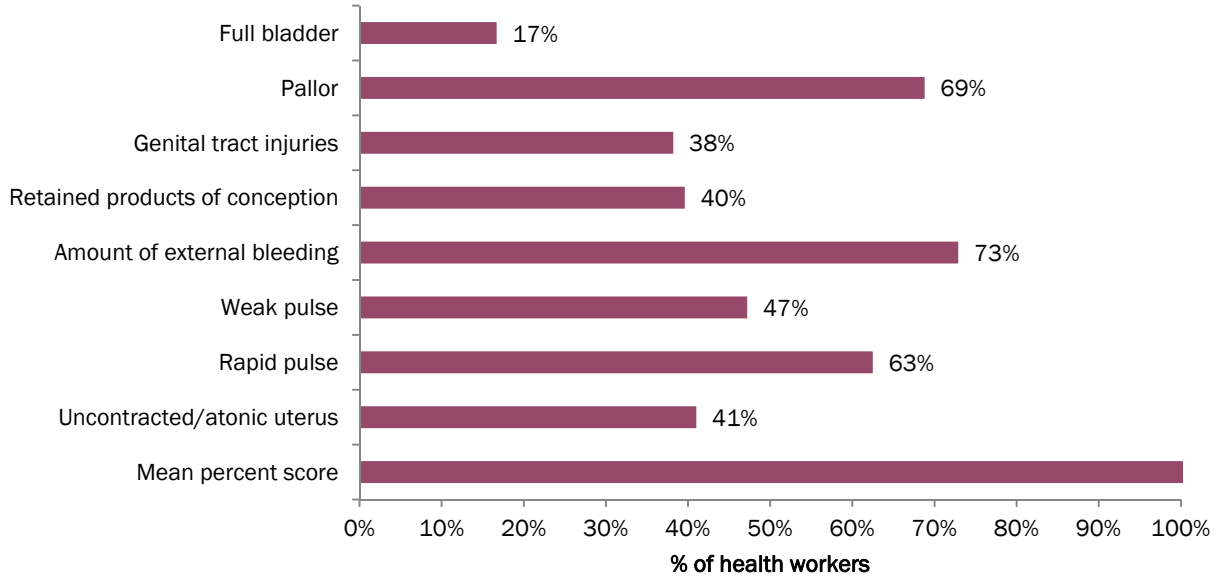
Figure 4.2 Health workers' knowledge of prevention, identification and management of complications



[1] Mean score of signs of sepsis in newborn (Figure 4.10)
[2] Mean of scores for (1) evaluation and (2) actions for a woman who presents 72 hours after delivery with general malaise (Figures 4.8 and 4.9)
[3] Mean of scores for (1) signs of obstructed labor (Figure 4.6) and (2) actions to identify/treat obstructed labor (Figure 4.7)
[4] Mean score for newborn resuscitation simulation (Appendix Table D)
[5] Mean of scores for PE/E case study (Appendix Table E)
[6] Mean of scores for (1) signs to assess in a woman with heavy postpartum bleeding (Figure 4.3), (2) actions for woman with PPH due to atonic uterus (Figure 4.4) and (3) actions for retained placenta and/or products of conception (Figure 4.5)
[7] Mean score for immediate newborn care (Figure 4.11)

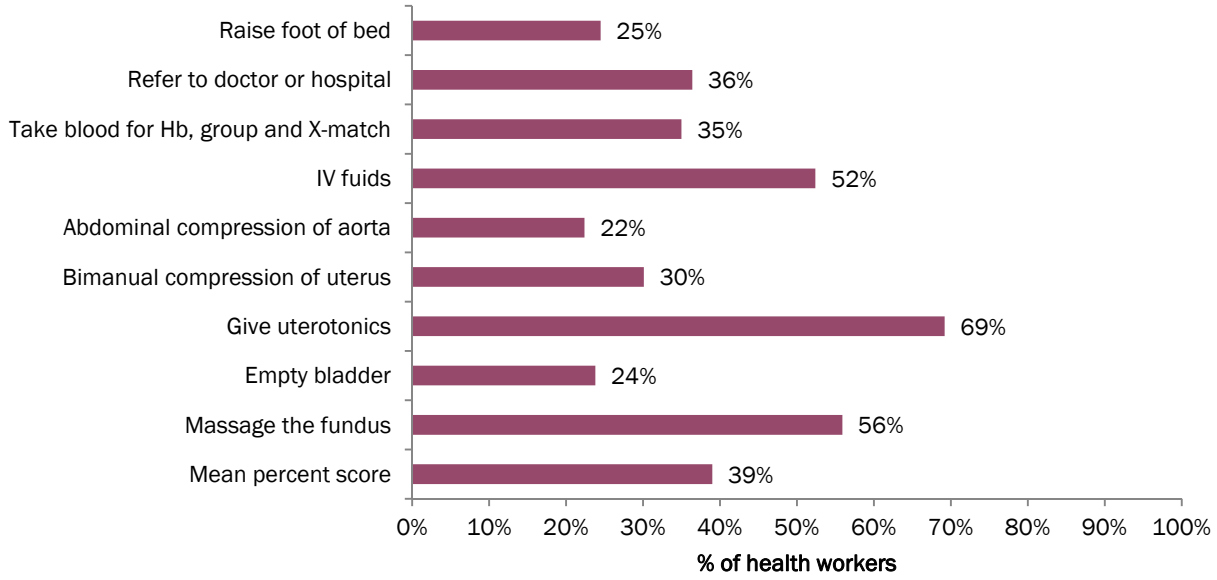
Figures 4.3–4.11 present the scores on individual knowledge questions. Figures 4.3, 4.4, and 4.5 show scores on questions related to postpartum hemorrhage.

Figure 4.3 Knowledge of signs to assess in a woman with heavy postpartum bleeding



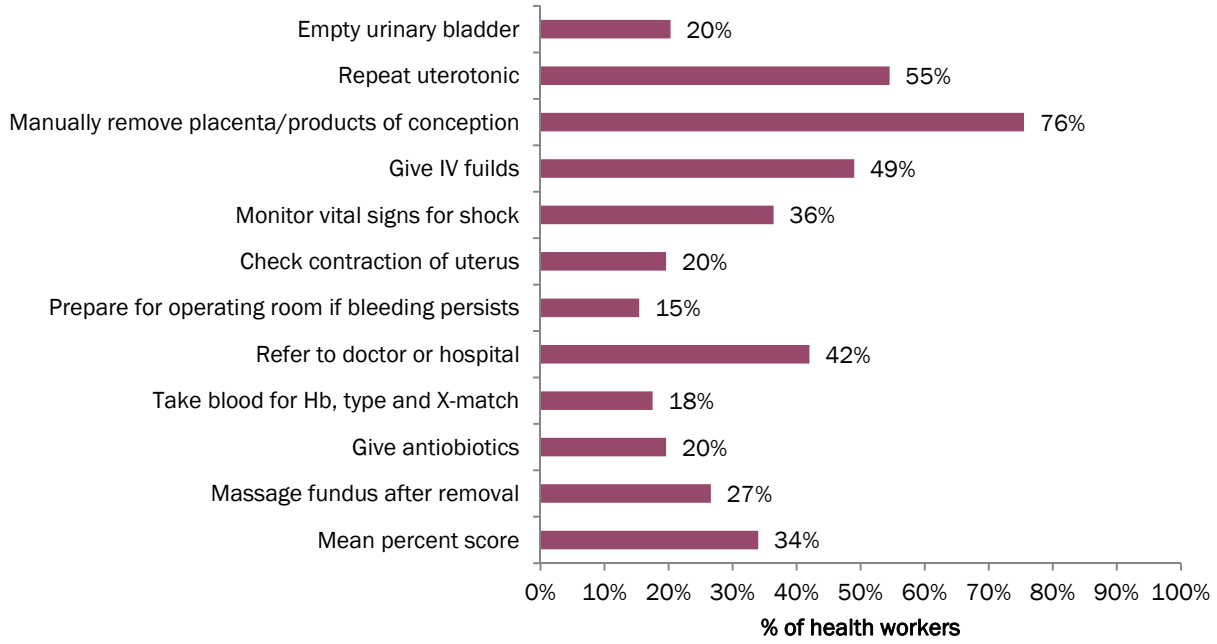
The mean percentage score for providers' knowledge of signs to assess in a woman with heavy postpartum bleeding was 48%. The score for checking whether the bladder is full was very low (17%), and scores for checking for retained products and genital tract injuries were fairly low (40% and 38%). Health workers scored higher on more obvious signs of bleeding such as checking for external bleeding, pallor and rapid pulse. Only 5% of interviewed providers responded with all 8 correct answers.

Figure 4.4 Knowledge of actions to take for a woman with postpartum hemorrhage from atonic uterus



The mean percentage score for providers' knowledge of actions to take for a woman with heavy bleeding due to an atonic uterus was 39%. Scores were low for raising the foot of the bed (25%), emptying the bladder (24%) and bimanual compression of the uterus (30%), all of which can be implemented without the need for equipment or drugs. Providers had a somewhat better understanding of giving uterotonics, IV fluids and massage of the fundus.

Figure 4.5 Knowledge of actions to take for a woman with retained placenta or products of conception



The overall mean score for correct actions to take to address retained placenta/products of conception was only 34%. The scores for individual actions ranged widely, but scores were very low for a majority of these important actions. Approximately half of the providers knew to give

IV fluids and repeat the uterotonic injection. Knowledge questions on obstructed labor are shown in Figures 4.6 and 4.7.

Figure 4.6 Knowledge of signs of obstructed labor

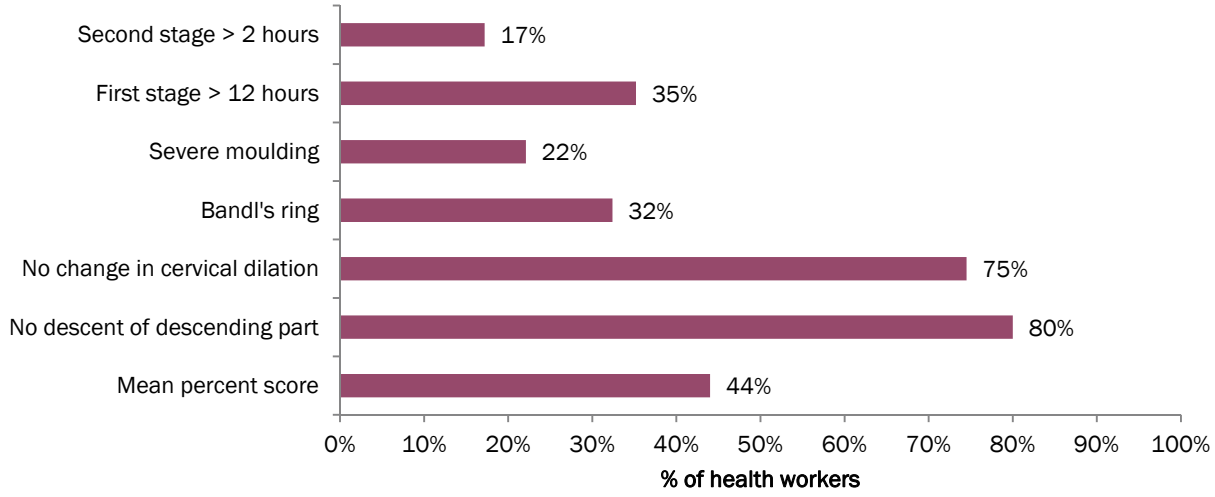
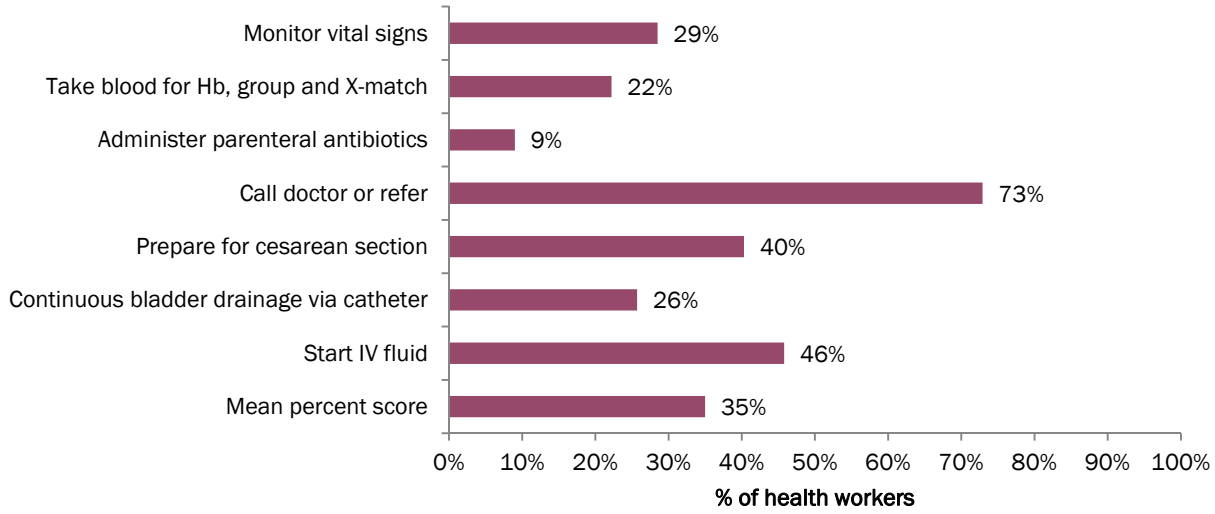


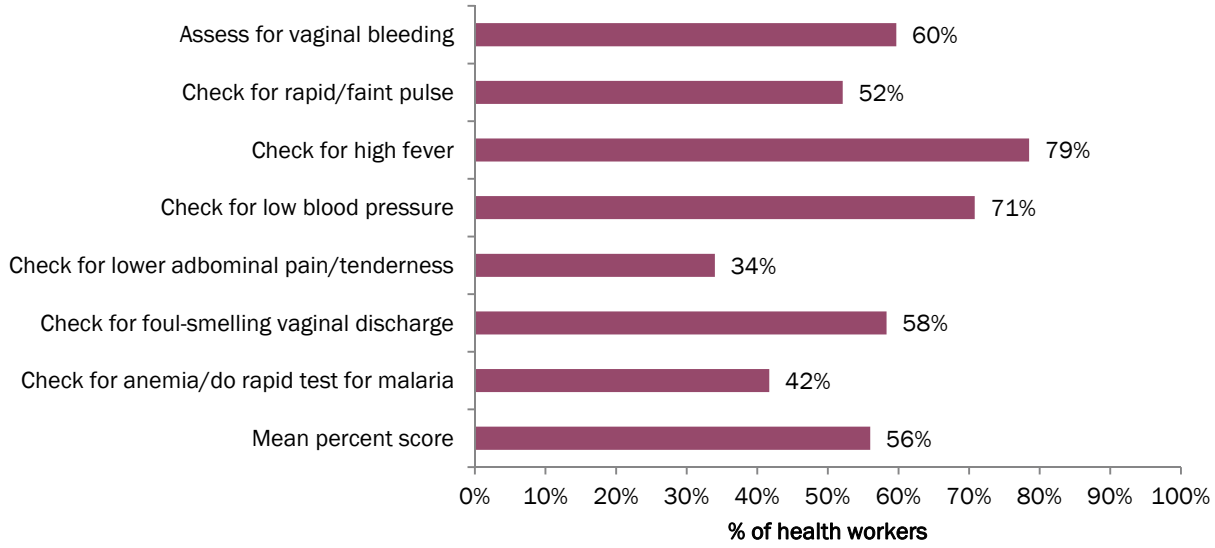
Figure 4.7 Knowledge of actions for identifying and treating obstructed labor



Knowledge scores on signs and actions for obstructed labor were low, with mean percent scores of 44% for signs and 35% for actions. However, knowledge scores for two very key signs—"no change in cervical dilation" and "no descent of presenting part"—were high. In terms of knowledge of correct actions, health workers achieved a fairly high score on "call the doctor or refer," but they scored below 46% on all other actions.

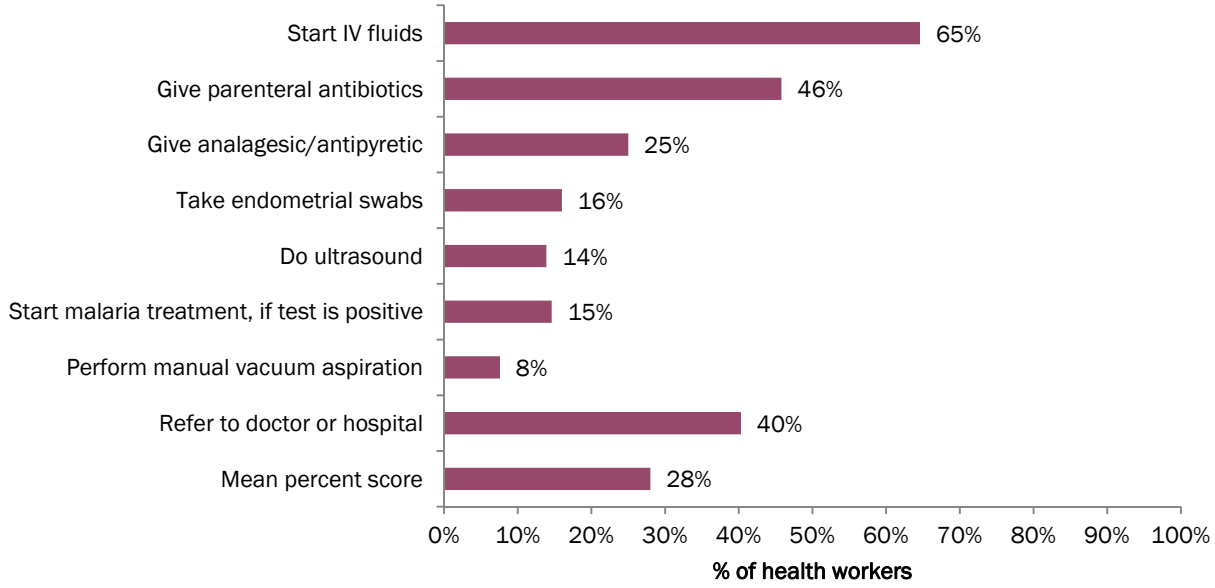
Providers' knowledge scores for individual questions on maternal postpartum sepsis are shown in Figures 4.8 and 4.9.

Figure 4.8 Knowledge of evaluation of a woman presenting with general malaise 72 hours postpartum



The mean percentage knowledge score for evaluation for sepsis in a woman 72 hours postpartum was higher (56%) than any other area for maternal care, and over 70% of the health works knew to check the woman for low blood pressure and for fever. Close to 60% knew to check for foul-smelling vaginal discharge and bleeding.

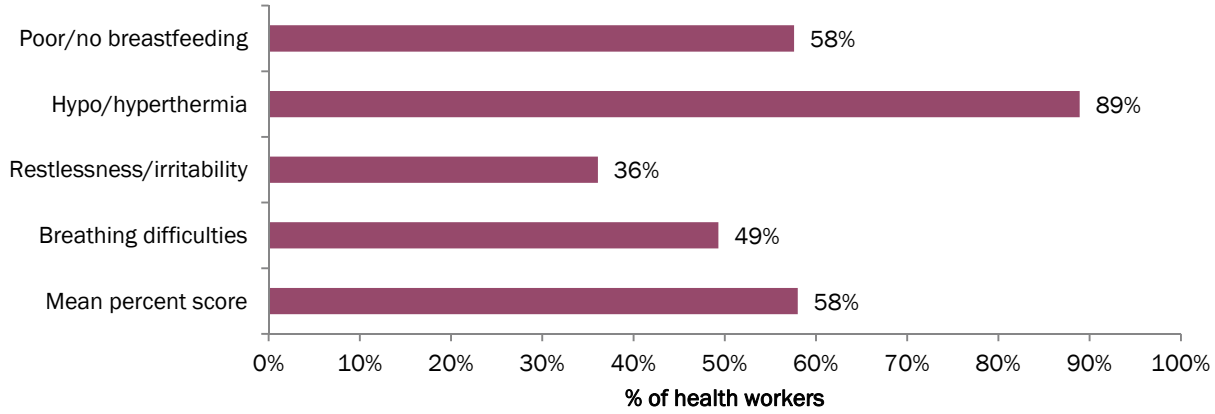
Figure 4.9 Knowledge of actions to take for a woman with general malaise 72 hours postpartum



Overall, health workers scored very low on knowledge of correct actions to take for a woman presenting with general malaise, with a mean score of only 28%. Knowledge scores for five of the key actions were less than or equal to 25%. Health workers scored highest on starting IV fluids (65%) and giving antibiotics (46%).

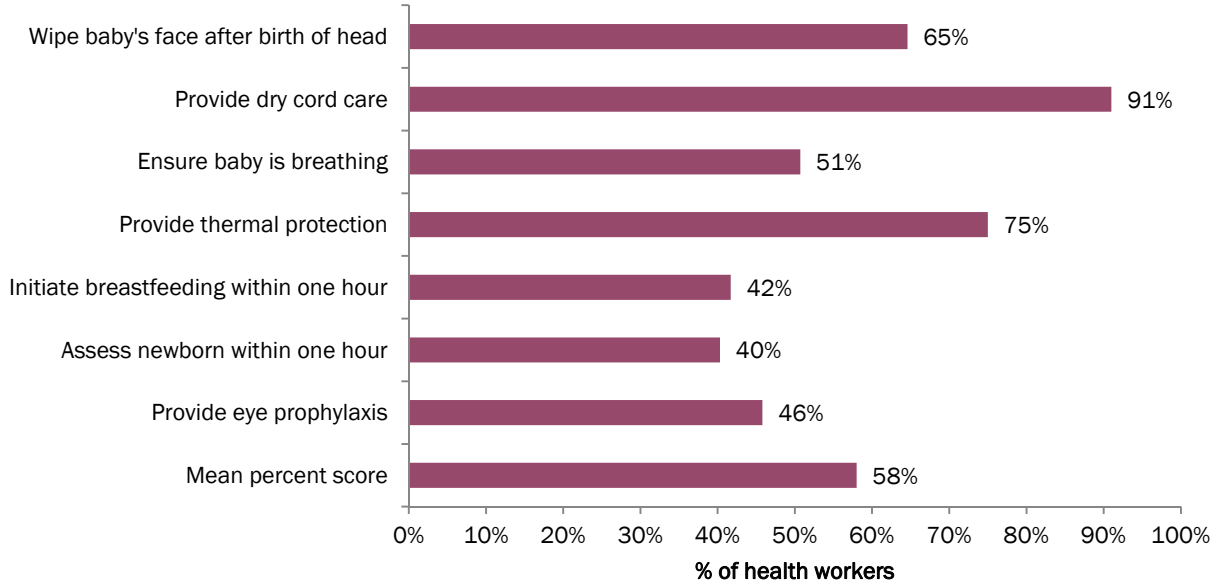
Figures 4.10 and 4.11 show the knowledge scores for signs of newborn sepsis and immediate care of the newborn. The mean percent scores for both immediate newborn care and recognition of newborn sepsis were 58%, higher than the mean percentage score for any other area.

Figure 4.10 Knowledge of signs of newborn sepsis



Most health workers (89%) identified hypo/hyperthermia as an important sign. However, knowledge levels were lower on the other key signs of newborn sepsis, such as breathing difficulties, poor breastfeeding and restlessness.

Figure 4.11 Knowledge of immediate newborn care



Health workers' knowledge of dry cord care and providing thermal protection were high, but could be higher for "ensure baby is breathing." Less than half of the health workers interviewed knew to initiate breastfeeding and to perform newborn assessment within one hour of birth.

4.5 SUPERVISION AND MANAGEMENT

Approximately 77% of health workers interviewed (n=146) reported that they had been supervised in the last three months. Those health workers were then asked whether the supervisor performed specific actions.

Table 4.4 Reported supervisor actions in the previous three months

SUPERVISOR ACTIONS	PERCENTAGE OF CASES (n=111)
Checked records	96%
Observed work	82%
Gave verbal feedback	94%
Provided any written comments	81%
Provided updates on administrative or technical issues	87%
Discussed problems you encountered	87%
Participated in quality of care improvement activities	89%

The percentage of supervisors observing providers at work, giving feedback (either verbal or written), discussing problems, and participating in quality improvement were all 80% or above and suggest a high level of participatory supervision in the assessed facilities.

5. ROUTINE ANTENATAL AND DELIVERY CARE

5.1 FOCUSED ANTENATAL CARE

Figure 5.1 Provision of key components of focused antenatal care

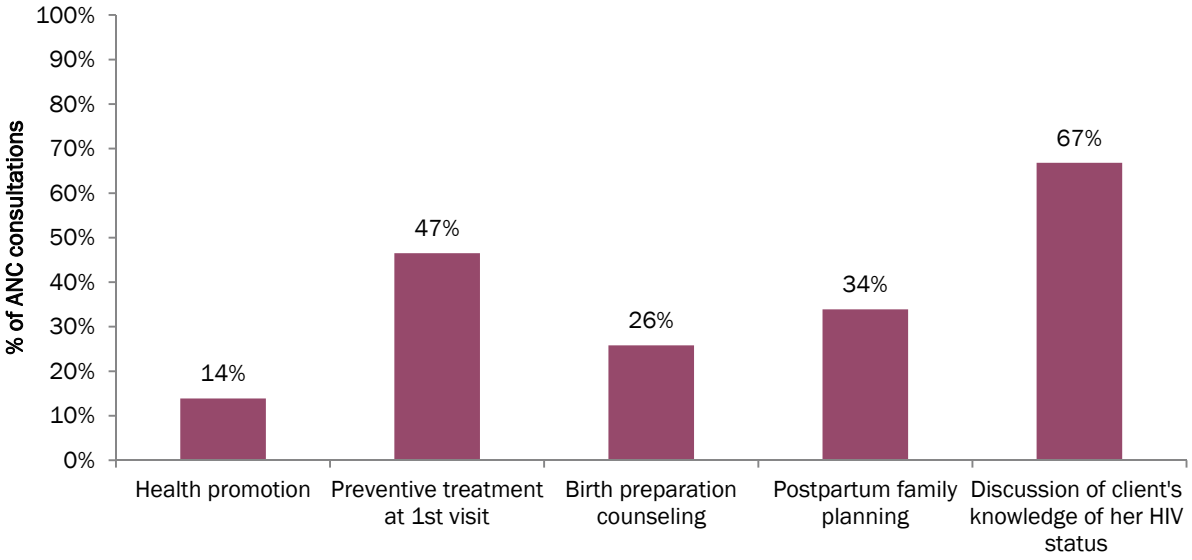


Figure 5.1 shows the observed performance of the key elements of focused antenatal care (FANC) as well as separate data for postpartum family planning and client's knowledge of HIV status, both of which are key elements of national policy for ANC in Rwanda. The observation checklist did not record information on an exhaustive list of all the elements of FANC but rather on a key subset within each of the main categories of FANC. Categories were selected on the basis of recognized evidence-based interventions according to the WHO.

The elements of FANC are grouped into the following categories:

- **Health promotion** includes counseling on pregnancy danger signs and postpartum family planning.
- **Preventive treatments** include administration of tetanus toxoid injection and prescription for or provision of iron and folic acid at the first ANC visit.
- **Birth preparation counseling** includes asking the client where she will deliver and counseling her to set aside money, use a skilled birth attendant, and have items ready for an emergency home delivery, if needed.
- **Postpartum family planning** is included in health promotion, but data are also shown separately.
- **Knowledge of HIV status** reflects whether or not the health worker asked the client whether she knows her HIV status.

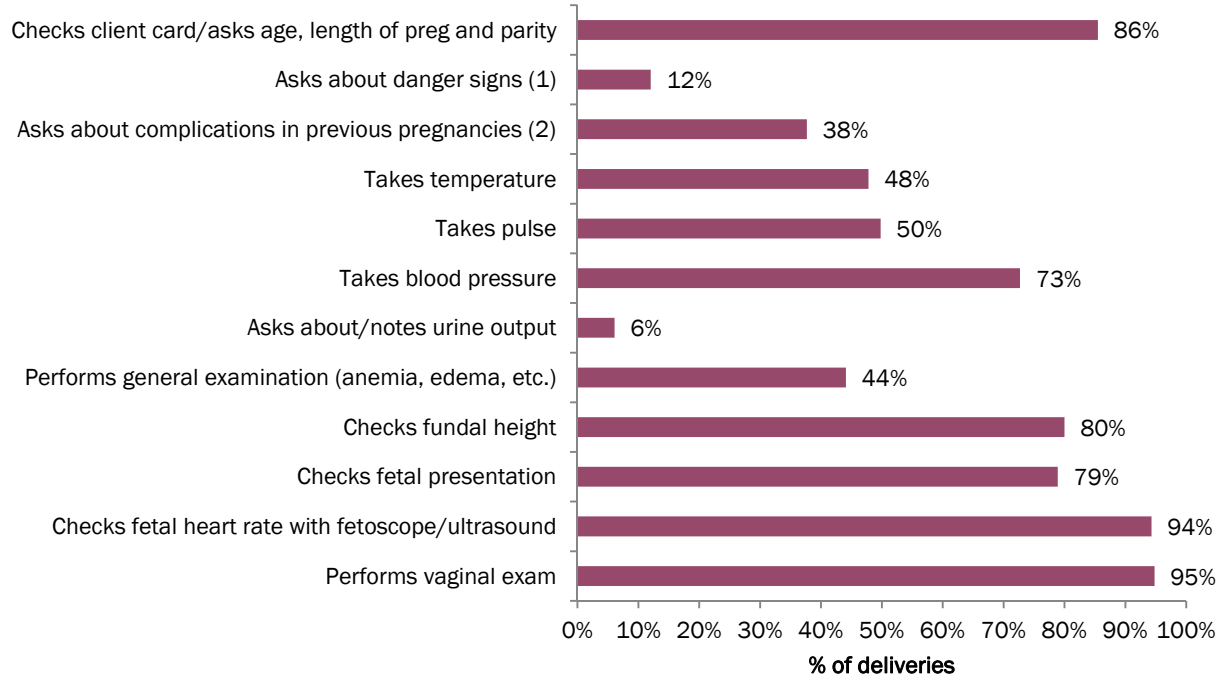
The performance of all three main categories of FANC was below 50%, with health workers scoring highest on preventive treatments (47%). These scores are based on the observation of between 291 and 302 cases, and indicate poor overall quality of antenatal care. However, it is important to note that this assessment does not include interactions with the client that could have occurred at a previous visit.

5.2 ROUTINE LABOR AND DELIVERY CARE

Initial client assessment

Routine labor and delivery care encompasses activities ranging from initial assessment to care during the first, second, third and fourth stages of labor. This section presents findings from the observation of initial assessment tasks. Other tasks are discussed in ensuing sections of the report.

Figure 5.2 Performance of initial client assessment tasks for mothers in labor



[1] Mean percentage for individual danger signs: fever, foul-smelling discharge, headaches or blurred vision, swollen face or hands, convulsions or loss of consciousness, shortness of breath, vaginal bleeding
[2] Mean percentage for individual complications: high blood pressure, convulsions, heavy bleeding during/after delivery, previous cesarean section, prior stillbirth, prolonged labor, prior neonatal death, prior abortion, prior assisted delivery

The quality of initial client assessments was found to be good in several important areas—namely, checking the client's card and history, checking the fundus, fetal presentation and fetal heart rate, and vaginal exam, all of which were performed in 80% or more of the consultations. General tasks such as taking vital signs and performing a general examination for anemia were performed moderately frequently while asking about urine output was observed least often, in only 6% of the observed consultations.

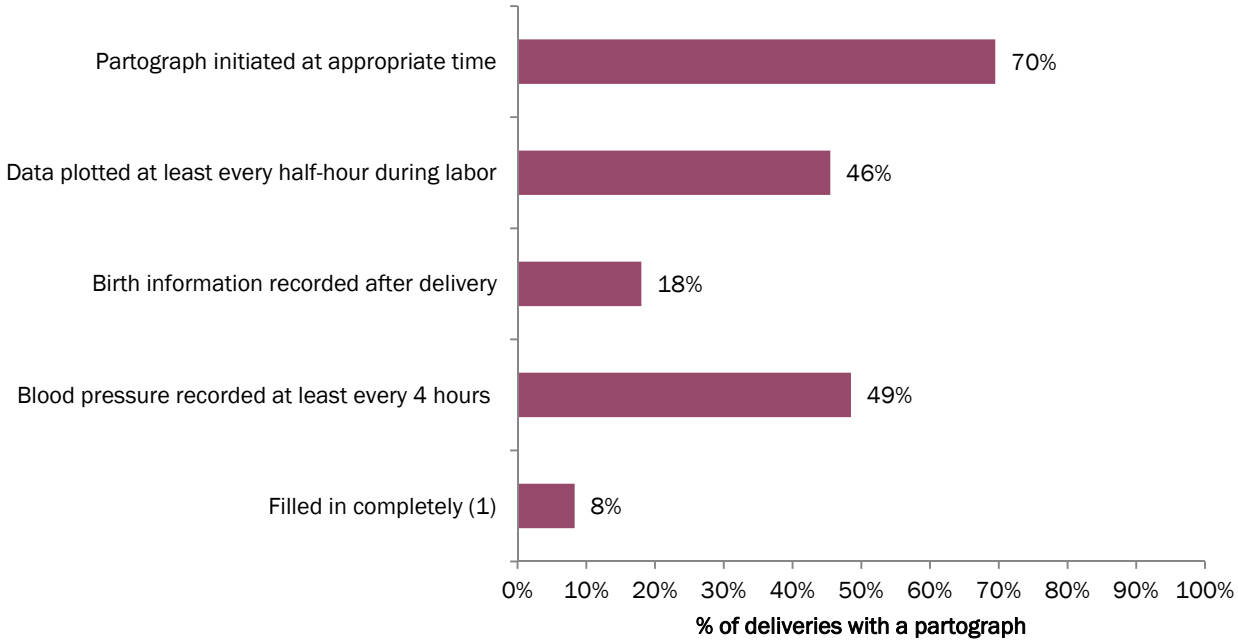
The mean score for asking the client about danger signs in pregnancy was only 12%, and questions regarding shortness of breath, convulsions or loss of consciousness, and headaches or blurred vision were rarely asked. Vaginal bleeding was the most frequently asked about sign (28% of assessments). In contrast, providers scored 40% on asking about complications in previous pregnancies, including specific questions about abortion (60%), prior stillbirth (58%), neonatal death (52%), cesarean section (47%), prolonged labor (44%) and assisted delivery (40%).

It is recommended that the initial evaluation of mothers in labor should be comprehensive and should provide detailed information on maternal, fetal and labor status. The initial assessment provides the basis for further management of labor and delivery. Thus, a complete assessment provides health workers with information as to risk classification and whether or not extra care and monitoring is required. A substantial proportion of clients were assessed adequately in terms of some assessment tasks, for example, asking client about age and parity, conducting an abdominal examination, assessing fetal position and heart monitoring and vaginal exam. However, by not asking about danger signs, providers could be missing an important opportunity to identify women in need of more care or immediate referral. Potential reasons for these omissions are a lack of understanding of the importance of these tasks or the varying emphasis given to these tasks in different guidelines and curricula or by different supervisors. The busy and overstretched provider might only focus on the immediate health condition at hand and on whatever they deem to be the most essential task based on verbal and visual cues (for example, whether the patient appears distressed) and the gynecological exam. It could also be that consistent taking and recording of vital signs is not as valued in a medical culture that does not have consistent medical recordkeeping or litigation procedures.

Performance of prevention practices for obstructed labor (partograph use)

WHO and other authorities recommend the use of a partograph to help birth attendants make better decisions for the diagnosis and management of prolonged and obstructed labor and detect fetal distress and severe pre-eclampsia by routinely measuring and recording blood pressure. Quality of care data from this study indicates that partograph use is very common in Rwanda. Partographs were used in 84% of observed labors (n=287) across 64 different health institutions.

Figure 5.3 Quality of partograph use



[1] Data plotted at least every half-hour, details of birth filled in and blood pressure recorded at least every 4 hours.

Figure 5.3 shows the completeness of the partograph as assessed using selected variables. The partograph was filled out at least every half-hour in nearly half of labors. Correct timing of initiation of the partograph occurred more frequently (70%). Among women for whom a partograph was used, appropriate start time was found to be higher with the use of the new WHO partograph (84%, started at 4 cm) than with the old WHO partograph (26%, started at 3 cm). This may indicate that providers have been trained to start at 4cm following the new protocol, but only have access to the old forms. Only 8% of partographs were filled in completely, primarily due to the low percentage of labors in which all of the birth information (birth time, delivery method and estimated blood loss) was recorded after delivery. Estimated blood loss was filled in least frequently, and it is not clear whether this is because blood loss was not monitored or because it was not recorded. The low partograph completeness rate was similar to or lower than findings from other studies in similar settings in Uganda and Benin (WHO 2003; Azandegbe, Testa and Makoutode 2004). When information on the partograph is incomplete, misinterpretation is more likely and may lead to delayed diagnosis, inappropriate or no action, and consequent development of serious complications.

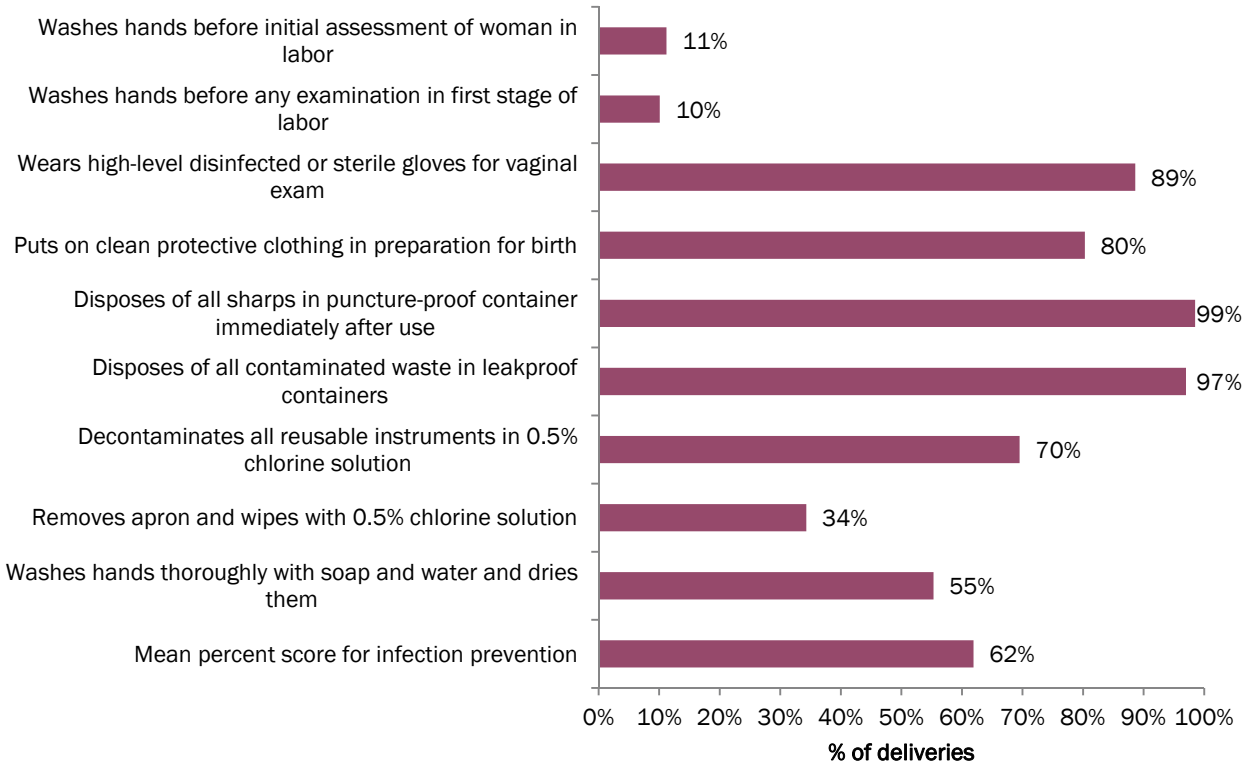
Blank partographs were available in nearly all facilities (99% of 69 facilities), and 87% of health workers reported during interviews that they had used a partograph in the last week. Among providers interviewed, 44% reported that they had been trained in subjects related to delivery in the past three years. While great strides in use of the partograph have been made in Rwanda, there may be a need to conduct qualitative research to better understand how consistent and complete partograph use can be better promoted and supported. The Rwanda performance-based financing quality checks include use of a partograph, which is both an advantage and a challenge. Routine checks of partograph use should encourage providers to use the tool; however the application of data on partograph use to determine financial incentive payments for health facilities may prompt health facilities to fill in the partograph after delivery in preparation for an audit, resulting in inaccurate data collection.

Performance of infection prevention practices (prevention of puerperal sepsis)

Sepsis is one of the five most common causes of maternal death worldwide and in Africa. It can be controlled if aseptic techniques are respected during labor management and if early signs of infection are recognized and treated in a timely manner. Practices to prevent (or manage) sepsis in the mother or newborn were not examined in this study in the same depth as practices for other complications. However, one key set of preventive practices was examined: infection prevention and hygiene practices. These recommended behaviors are a core strategy in preventing infection transmission in health care settings (Garner 1996). Standard IP practices during delivery care are aimed at not only preventing maternal and neonatal infections, but also preventing infection of the health worker. Adherence to IP practices was assessed against a set of standard precautions including frequent hand washing, use of protective barriers, decontamination of reusable items in chlorine solution, and disposal of contaminated items into containers appropriate for the item (see Figure 5.4).

Furthermore, data collectors conducted an inventory of items required for infection prevention and recorded whether the items were readily available in the delivery room or stored nearby. The indicators observed correspond closely with those included in ICF International's Service Provision Assessments, so the results can be considered alongside results obtained in countries where the SPA has been conducted.

Figure 5.4 Provider performance of infection prevention practices during labor and delivery care



The mean percentage score for adherence to standard infection prevention practices was 62%.

Hand washing

The minimum recommended standard is that hands be washed with plain soap and water before and after patient contact (Centers for Disease Control and Prevention 2002). Hand washing was done after 55% of deliveries and rarely before initial or subsequent assessments. It is disappointing to find that this simple practice is rarely adhered to, not only because it is cost-

effective, but also because failure to do so increases the risk of maternal sepsis and the possibility of cross infections of diseases like HIV and human papilloma virus (HPV). The finding that routine hand washing after delivery was much more common than hand washing before or between examinations may mean that health care workers give more emphasis to self-protection as opposed to protecting clients from cross infection.

Use of personal protective gear

In a high proportion of observed labors, health care workers wore high-level disinfected or sterile gloves for vaginal examination (89%) and clean protective clothing in preparation for birth (80%). The high use of protective gear may similarly be motivated by personal concerns about infection and cleanliness. Current national policy mandates universal use of personal protective equipment, so there is still a room for improvement in this component of IP practice.

Decontamination of reusable items

The finding of a high rate of compliance (70%) for decontamination of reusable instruments in 0.5% chlorine solution indicates that disinfection has attracted a great deal of attention among providers and managers alike. The observation in labor wards that already mixed decontamination solution was present in 99% of all surveyed facilities is an additional testimony in this regard. However, the other decontamination-related practice (making aprons safer for subsequent use) was observed in only a third of observations, which is a concern not only because it could be a hindrance to the consistent use of aprons, but also because contaminated aprons could be a vehicle for infection transmission and could undermine the adequacy of other IP practices.

The capacity with regard to high level disinfection was adequate. For sterilization capacity, the mean score was 59%. This includes **functioning electric or non-electric equipment for sterilization (93%), written protocols (19%) and** functioning automatic timer or TST indicator strips (64%). **Overall, 60% of facilities had a functioning autoclave.** The lack of written protocols for disinfection could be targeted for improvement at relatively low cost and effort.

Disposal practices

Universal infection control guidelines stipulate that used sharps and contaminated waste must be placed in puncture-resistant and leak-proof containers, respectively. Our findings indicate excellent compliance with this recommendation (99% for sharps; 97% for contaminated waste). Furthermore, the universal availability of sharps containers across all surveyed facilities is commendable; it is a clear indication of health facility management's support for this IP practice.

Woman-centered care during labor and delivery

The quality of care a pregnant women receives during labor and delivery can be measured in part by the extent to which she is treated with respect, has appropriate communication with and emotional support from the health care provider, and is provided with a degree of privacy. Lack of respect for women and their birthing preferences and abusive care have been shown to be deterrents to the use of facility-based delivery care services (Bowser and Hill 2010). Thus, it is important to understand how women are being treated during labor and delivery. Care that responds not only to the physical needs of women in labor, but also to their emotional needs and right to privacy is referred to in this report as "woman-centered care."

Table 5.1 Performance of interpersonal communication and support tasks during labor

COMMUNICATION AND SUPPORT TASKS FOR INITIAL ASSESSMENT	PERCENTAGE OF CASES (n=192)
Respectfully greets pregnant woman	72%
Encourages the woman to have a support person present throughout labor and birth	42%
Asks woman (and support person, if present) if she has any questions	37%
Explains procedures to woman (support person) before proceeding	36%
Informs the pregnant woman of findings	51%
COMMUNICATION AND SUPPORT TASKS FOR FIRST STAGE OF LABOR	**PERCENTAGE OF CASES (n=233)**
At least once, explains what will happen in labor to pregnant woman and her support person	60%
At least once, encourages woman to consume fluids/food throughout labor	44%
At least once, encourages/assists woman to ambulate and assume different positions during labor	64%
Supports the woman during labor in a friendly way	95%
Drapes woman	71%
Mean percentage score for woman-centered care	**58%**

The study found that three-quarters of the observed women in labor were greeted respectfully by the provider. However, only 37% were asked by the provider if they had any questions. Explanations of procedures and what would happen during labor hovered in the 40% range, but explanations of findings were markedly higher (51%). Sixty-four percent of women were encouraged to move around and assume different positions during labor, and about half were told by the provider they could have some food and drink during labor. The privacy of the woman was protected using drapes in 71% of cases, and more than 90% of women were supported by the provider during labor in a friendly manner.

While the great majority of providers showed respect in their interactions with clients, they did not always provide information that would help the laboring woman be more comfortable or feel more at ease. The overall mean score of 58% for this domain of care suggests that there is room for improvement in how providers treat their patients. Providers need to be encouraged during basic and in-service training, and by their supervisors, to ensure that they communicate with women about what is happening during labor and birth and that they offer friendly and respectful support to promote a quality birth experience.

Performance of immediate and essential newborn care

Overall, the mean score for immediate newborn care tasks was 65%. Observations of specific newborn care tasks are shown in Table 5.2.

Table 5.2 Performance of immediate newborn care tasks

NEWBORN CARE TASKS	PERCENTAGE OF CASES (n=225)
Places newborn skin-to-skin with mother	51%
Immediately dries baby with towel*	100%
Discards wet towel and covers with dry towel*	52%
Cuts cord with clean blade*	100%
Ties/clamps cord when pulsations stop, or within 2–3 minutes after birth (but not immediately after birth)	63%
Assists the mother to initiate breast feeding within the first hour*	25%
Mean percent score for immediate newborn care tasks	**65%**
All essential newborn care tasks performed	**14%**

*Essential newborn care steps

All newborns were immediately dried, which is a very positive finding, but only about half of the newborns were put in skin-to-skin contact with their mothers or covered with a dry towel (discarding wet towel). The relatively low adherence to the latter two thermal control standards is a concern because hypothermia is a major contributing factor to death due to sepsis and newborn asphyxia (the most common causes of newborn mortality), especially among low birth weight babies.

Early initiation of breastfeeding is encouraged by WHO and UNICEF because first breast milk contains colostrum, which is highly nutritious and has antibodies that protect the newborn from diseases. Early initiation of breastfeeding also fosters bonding between the mother and child. Helping the mother initiate breastfeeding within the first hour, especially when combined with antenatal education, is effective for increasing the breastfeeding initiation rate and prolonging exclusive breastfeeding (Fairbank et al. 2000; Stockley 2004). It is worrisome that this simple and effective practice was provided to only a fourth of postnatal mothers. In stark contrast to these findings, the Rwanda 2008 DHS reported that 74% of women who gave birth in a health facility started breastfeeding within one hour of birth and 80% of women who were assisted by a traditional birth attendant started breastfeeding within one hour. However, the QOC survey asks about assistance by the provider, not just performance of the behavior, and this may be the reason our results are lower.

Prevalence of nonbeneficial and nonindicated practices

The frequency of nonbeneficial and nonindicated obstetric practices was assessed using 12 indicators, including eight nonbeneficial practices and four nonindicated practices. *Nonbeneficial* practices are those that are defined as never being indicated under any circumstances while *nonindicated* practices may be useful under some circumstances, but were not indicated in the context of the specific case under review. Overall, at least one nonbeneficial or nonindicated practice was reported in 50% of deliveries.

Table 5.3 Nonbeneficial and nonindicated practices

NONBENEFICIAL PRACTICES	PERCENTAGE OF CASES (n= 279)
Use of enema	0%
Pubic shaving	2%
Applying fundal pressure	13%
Lavage of the uterus after delivery	0.2%
Slapping newborn	4%
Holding newborn upside down	3%
Milking the newborn's chest	0%
Stretching of the perineum	21%
No nonbeneficial practices	68%
Nonindicated practices	
Manual exploration of the uterus after delivery	14%
Use of episiotomy	13%
Aspiration of newborn mouth and nose at birth	13%
Restricting food and fluids in labor	2%
No nonindicated practices observed	65%

The most commonly observed nonbeneficial practices were stretching of the perineum (21% of cases) and applying fundal pressure (13% of cases). Routine use of enema and milking of the newborn's chest were not observed in any of the cases. Nonindicated manual exploration of the uterus was observed in 14% of deliveries and nonindicated episiotomy and aspiration of the newborn's mouth/nose were also observed in a relatively high proportion of deliveries (13% each).

Although the use of any type of nonbeneficial/nonindicated practice should be a concern, some practices, irrespective of their prevalence, demand more attention because they pose a serious risk of harm. These include applying fundal pressure, use of episiotomy, manual exploration of the uterus after delivery, and lavage of the uterus. Lavage of the uterus was not observed in this sample, but the other three nonbeneficial/nonindicated practices were observed too frequently and need to be addressed.

Various studies, including systematic reviews, have shown that routine use of episiotomy does not confer benefits but rather exposes women to risks of harm such as perineal injury, which increases the likelihood of fecal or gas incontinence and dyspareunia, among problems (Hartmann et al. 2005). Episiotomy also puts the woman at risk for infection and sepsis while the tissue is healing. The finding that 13% of women received nonindicated episiotomies is a clear cause for concern.

The nonindicated use of manual exploration of the uterus, which was observed in 14% of deliveries, raises concerns because the practice is associated with puerperal infections/sepsis. Manual exploration of the uterus is beneficial when it is clearly indicated, as in suspected cases of retained fragments of conception and in the evaluation of PPH following vaginal birth with

history of cesarean section. However, those conditions were absent in the cases recorded here. Applying fundal pressure was observed in 13% of cases which is a concern because it is a risk factor for fatal maternal complications—namely, puerperal infection and PPH secondary to iatrogenic injuries to the uterus.

6. PREVENTION AND MANAGEMENT OF MAJOR MATERNAL AND NEWBORN COMPLICATIONS

6.1 PROVISION OF EMERGENCY OBSTETRIC CARE SIGNAL FUNCTIONS

Twenty-four hour delivery service was available at 95% of the hospitals (37 of 39, 1 missing) and 75% of the health centers (21 of 28, 1 missing). All hospitals should have the capacity to serve as comprehensive emergency obstetric and newborn care (CEmONC) facilities, while health facilities should have the capacity to serve as basic emergency obstetric and newborn care (BEmONC) facilities, according to the Ministry of Health norms. In the field, data indicated most health centers were not providing the full package of the BEmONC. The facilities' reported performance of the signal functions for BEmONC and CEmONC over the three months prior to the survey is shown in Table 6.1.

Table 6.1 Reported provision of the EmONC signal functions in previous three months

DELIVERY METHOD	PERCENTAGE OF REFERRAL AND DISTRICT HOSPITALS (n= 40)*	PERCENTAGE OF HEALTH CENTERS (n= 29)*
Assisted delivery	58%	4%
Removal of retained products of conception	75 %	0 %
Use of parenteral oxytocic drugs	68%	21%
Use of parenteral anticonvulsants for PE/E	41%	12 %
Parenteral antibiotics for pregnancy-related infections	65%	46 %
Manual removal of placenta	65 %	29 %
Newborn resuscitation	100 %	41 %
Blood transfusion	58%	0%
Cesarean section	100 %	0%

* No data was available for one referral hospital, one district hospital, and one health center

Table 6.2 shows the results of the assessment of the physical capacity of the health facilities for performance of the signal functions. Sample size differs for some specific items because not all sections of the questionnaire were filled out at all facilities.

Table 6.2 Availability of supplies and equipment to perform signal functions

SIGNAL FUNCTION*	MEAN PERCENT SCORE (NUMBER OF FACILITIES REPORTING) FOR REFERRAL AND DISTRICT HOSPITALS	MEAN PERCENT SCORE (NUMBER OF FACILITIES REPORTING) FOR HEALTH CENTERS
Assisted delivery (1)	91% (n=32)	0% (n=1)
Removal of retained products of conception (2)	94% (n=40)	63% (n=29, n=3 for MVA or D&C kit)
Parenteral oxytocics (3)	96% (n=40)	85% (n=29)
Parenteral anticonvulsants (4)	96% (n=40)	78% (n=29)
Parenteral antibiotics for infection (5)	91% (n=40)	79% (n=29)
Manual removal of placenta (6)	91% (n=40)	77% (n=29)
Newborn resuscitation (7)	81% (n=40)	66% (n=24)
Cesarean section (8)	89% (n=40)	No data

[1] Forceps or ventouse
[2] MVA or D&C kit, injectable oxytocin or ergometrine, syringes and needles, and ringer's lactate, D5NS or NS infusion
[3] Injectable oxytocin or ergometrine, syringes and needles, and ringer's lactate, D5NS or NS infusion
[4] Injectable magnesium sulfate, diazepam or phenytoin, syringes and needles, and ringer's lactate, D5NS or NS infusion
[5] Injectable ampicillin or gentamycin, syringes and needles, and ringer's lactate, D5NS or NS infusion
[6] Injectable ampicillin, injectable oxytocin or ergometrine, syringes and needles, and ringer's lactate, D5NS or NS infusion
[7] Bag and mask (infant size) or tube and mask (infant size), suction bulb, suction apparatus for use with catheter, resuscitation table for newborn
[8] Operating table, operating light, anesthesia giving set, scrub are adjacent to/in OR, tray/drum/package with sterilized instruments ready to use, halothane or ketamine, health worker who can perform c-section present or on call 24-hours per day, anesthetist present or on call 24-hours per day

Note: MVA is manual vacuum aspiration; D&C is dilation and curettage.

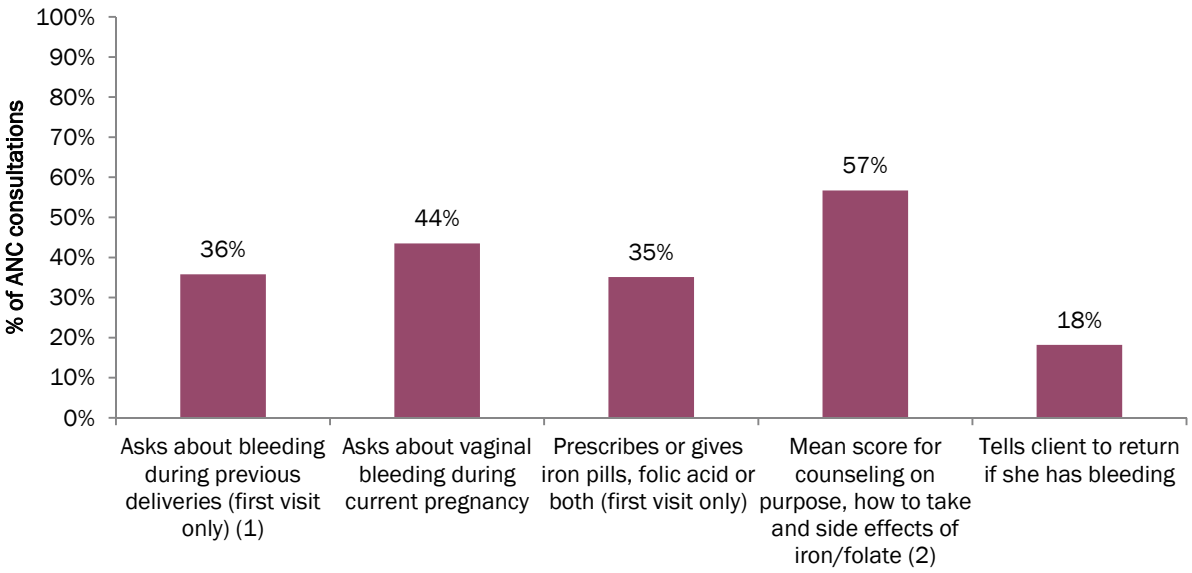
Availability of equipment and supplies to perform the signal functions was quite high across hospitals; shortages were more likely at health centers. Lack of appropriate supplies and equipment can be a limiting factor for performance of the signal functions. However, that does not seem to be the case here since. The percentage of facilities reporting performance of interventions using oxytocics, anticonvulsants, and antibiotics was much lower than the availability of supplies and equipment for those signal functions. The barrier to performance is more likely to be related to training, comfort level, or supervision.

6.2 PREVENTION AND MANAGEMENT OF POSTPARTUM HEMORRHAGE

Adherence to PPH prevention standards

During ANC visits, providers can assess and reduce the risk of PPH by asking about bleeding in previous pregnancies, asking if there is bleeding in current pregnancy, providing iron/folate (during the first visit) and counseling as to its use, and counseling clients to return if they experience any vaginal bleeding. Figure 6.1 presents the results of observations of these interventions during ANC.

Figure 6.1 Performance of antenatal care tasks to prevent PPH



[1] For patients with prior pregnancies (n=111)
[2] For patients who were prescribed or given iron/folic acid pills (n=130)

Overall, the percentage of ANC clients receiving PPH-related interventions was low, with only one-third of women given iron/folate at their first ANC visit, despite the association between anemia and a higher risk of hemorrhage (particularly severe hemorrhage) (Christian, Khatry, LeClerq and Dali 2009). Counseling on how to take iron/folate was provided to 57% of those who were given iron/folate. Data indicate that there were missed opportunities for the provider to ask about vaginal bleeding, a key danger sign.

Active management of the third stage of labor (AMTSL) is an effective intervention to reduce the risk of postpartum hemorrhage (greater than 1,000 ml blood loss) and maternal anemia (Begley et al. 2010). AMSTL consists of three interlocking components:

- Administer an uterotonic drug within 1 minute of delivery (oxytocin 10 IU IM being the drug of choice).
- Deliver the placenta with controlled cord traction.
- Immediately massage the fundus of the uterus until the uterus is contracted (WHO 2006b; ICM and FIGO n.d.).

The Cochrane Review states that "active management reduced the average risk of maternal primary haemorrhage (more than 1000 ml) (risk ratio (RR) 0.34, 95% confidence interval (CI) 0.14 to 0.87) and of maternal haemoglobin less than 9 g/dl following birth (RR 0.50, 95% CI 0.30 to 0.83) for women irrespective of their risk of bleeding." The practice of AMTSL in the current study was assessed based on the following criteria identified by WHO and FIGO/ICM: oxytocin given IM within 1 minute of delivery with controlled cord traction and uterine massage. Due to technical constraints and the time available to monitor postpartum care, observation of uterine massage was limited to immediately after delivery of placenta.

Figure 6.2 Deliveries with correct performance of AMTSL

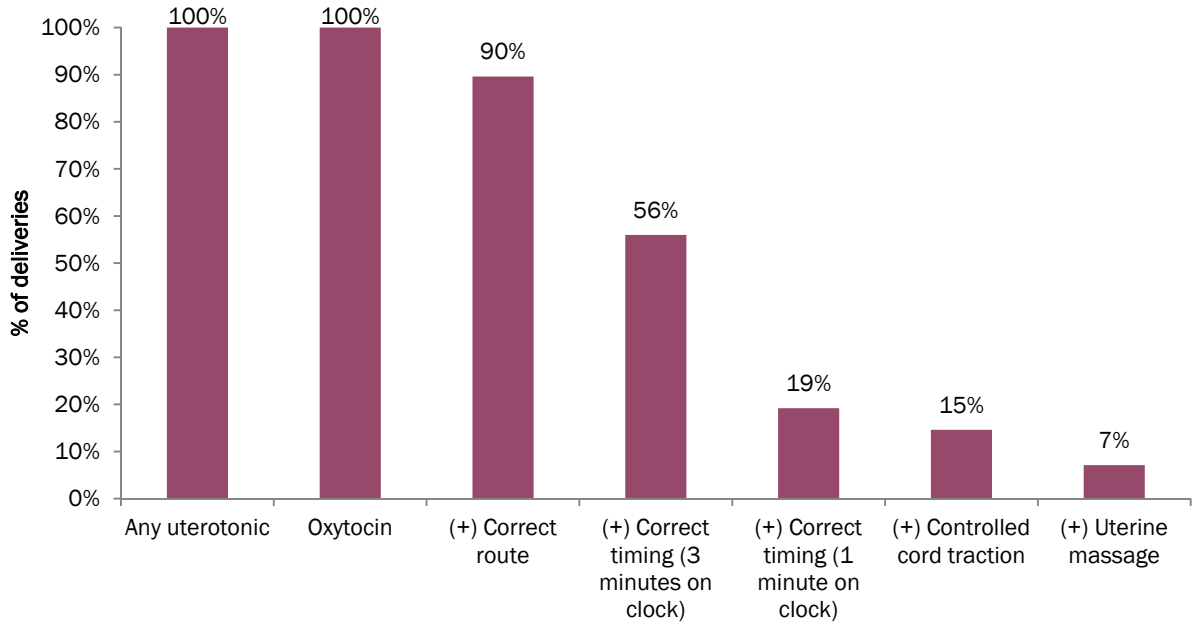
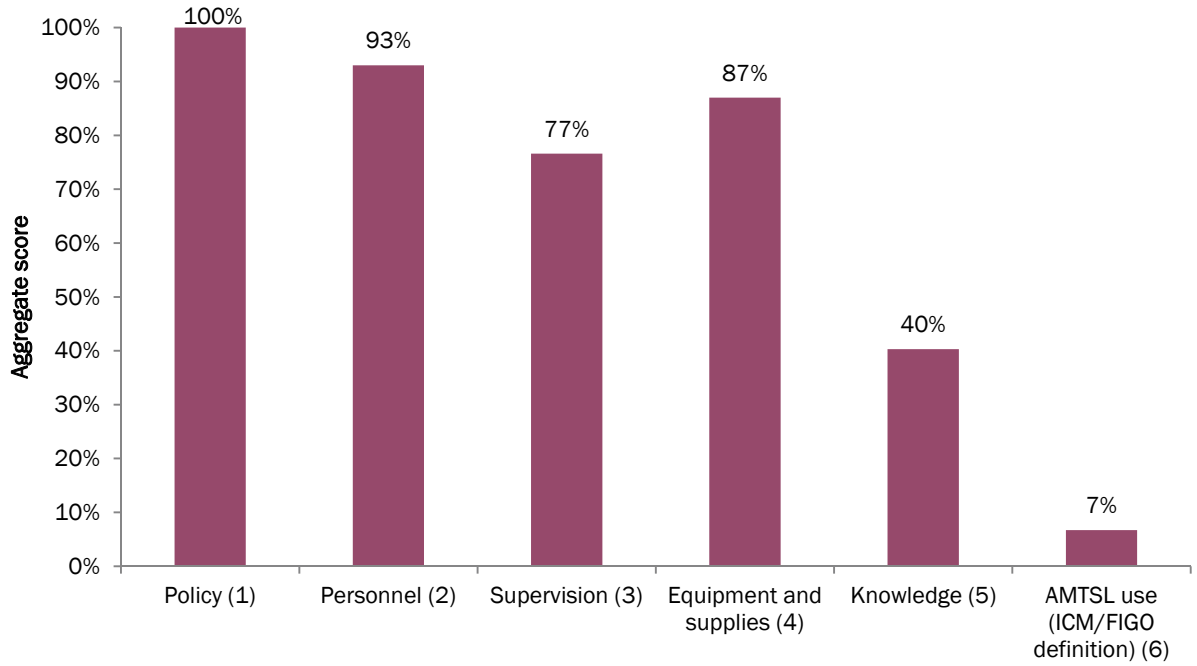


Figure 6.2 shows the percentage of deliveries in which each of the components of AMTSL using oxytocin were performed correctly; the bars are additive as they move from left to right and the denominator changes for each bar as cases that do not meet the criteria are dropped. Our analysis found that administration of oxytocin was universal at all facilities. However, when the analysis was limited to women who received oxytocin IM within three minutes following delivery, the percentage of women decreased dramatically to 56%. Using the standard of the FIGO/ICM definition and adding in the progressive steps, the proportion of women given oxytocin IM within one minute decreased to 19%. Adding in controlled cord traction caused the proportion to decrease to 15%, and adding in uterine massage caused it to decrease to only 7% of deliveries receiving all components of AMTSL. The most dramatic differences are due to delays in administration of uterotonic.

While correct performance of AMTSL, including oxytocin given within one minute, was very uncommon, it is not yet known which components of AMTSL are the most important and what timing is acceptable for administering a uterotonic (i.e., within one or within three minutes). When controlled cord traction and uterine massage are considered apart from uterotonic, 76% of cases received controlled cord traction and only 49% received uterine massage. WHO is currently conducting a multicenter, non-inferiority clinical trial to assess the value of controlled cord traction as part of AMTSL and the guidelines may change shortly. If a single provider is attending a woman at delivery, delivering the newborn and providing essential newborn care (drying, putting newborn skin-to-skin, ensuring breathing, and so on), all of which are necessary before oxytocin is administered, the provider would require more than one minute to administer the uterotonic. Therefore, the ability to adhere to this requirement in the guidelines may be constrained unless there is more than one birth attendant. A measure of performance based on an unrealistic goal may demoralize both providers and policymakers. Research to inform the timing would help to also inform the identification of an AMTSL indicator that can be included in countries' national health management information system (HMIS). A WHO working group is currently identifying a core set of maternal health indicators that can be incorporated into each country's HMIS.

Figure 6.3 From policy to practice: constraints analysis for PPH prevention



[1] See Table 4.1. Mean score of: oxytocin registered, on EDL, indicated for AMTSL, in SDGs, first line medication, with correct dose, controlled cord traction in SDGs, uterine massage in SDGs, all L&D health providers eligible to give oxytocin
[2] Percentage of births attended by skilled birth attendant
[3] Percentage of personnel who have received supervision in last three months
[4] Availability of oxytocin in facilities
[5] Score for knowledge of PPH (see Figure 4.2)
[6] See Figure 6.2

Figure 6.3 summarizes data from various parts of the assessment in an attempt to look at possible explanations for the observed infrequent AMTSL use. All policies were in place to support AMTSL use in Rwanda at the time of the survey, as evidenced by the inclusion of AMTSL (according to WHO/ICM/FIGO) in the pre-service curriculum and practice guidelines. There were also skilled attendants present at almost all observed births (93%) and an adequate supply of oxytocin or ergometrine (87%). Although AMTSL is a PPH prevention intervention and should be provided to all women, the aggregate knowledge score (40%) of health workers for the identification and management of PPH indicates that lack of knowledge among providers might be one of the most important barriers to the correct use of AMTSL. As shown in Figure 6.3, 77% of the health workers interviewed indicated that they had received some sort of external supervision at least once in the last three months. Although this finding is not specific to AMTSL, it is an indicator of a supportive environment where providers could learn about and be encouraged to use AMTSL.

The gap between knowledge scores and AMTSL use may indicate that complex factors, other than lack of knowledge and supportive environment, might also be in play. These factors could include a failure to translate learned knowledge into practice and/or resistance to changing previous practices. This hypothesis is strengthened by data collectors' observations that the majority of providers who were previously trained in AMTSL failed to correctly apply their skills.

Table 6.3 Quality of care in postpartum hemorrhage case management

CASE NUMBER	PROBABLE DIAGNOSIS	AMTSL	COMPLICATION MANAGEMENT
1	Lacerations	AMTSL not performed; only controlled cord traction performed	No massage; no uterotonic; tear found and repaired
2	Lacerations	All elements of AMTSL performed; oxytocin given within one minute of delivery; controlled cord traction; uterine massage	Fundus massaged; ergometrine given; tear found and repaired
3	Retained placenta	AMTSL not performed; only oxytocin given within one minute of delivery	No massage; no uterotonic; no tear found; manual removal performed
4	Retained placenta, lacerations	AMTSL not performed; only oxytocin given within one minute of delivery and controlled cord traction	No massage; misoprostol given; tear found and repaired; manual removal performed; referred to another facility; died before arriving at referral hospital

Observed management of women experiencing postpartum hemorrhage

Four cases of postpartum hemorrhage were observed; all occurred at district hospitals. In two cases the hemorrhage appeared to have been caused by lacerations. In one case bleeding stopped once the lacerations were repaired. In another case, the provider performed fundal massage and gave an uterotonic as first steps to stop the bleeding; neither of these steps were performed for the first case. The data collector on the first case noted that the health provider had many women in her care and did not fill out registration data or a partograph.

The third case was a woman who delivered one baby at a health center and was then referred for delivery of the second baby. Afterward she suffered PPH due to a retained placenta, which was removed. The provider looked for but did not find any lacerations. In the fourth case the woman received an uterotonic and had a laceration repaired, and she was also found to have a retained placenta. Manual removal was performed, and it involved several health workers and an anesthesiologist. The woman was given IV fluids and one unit of blood, and she was referred for further care when her vitals were stable. However, she died either while waiting for transport for the referral or during transport. Anemia was believed to be a contributing factor.

6.3 SCREENING AND MANAGEMENT OF PRE-ECLAMPSIA/ECLAMPSIA

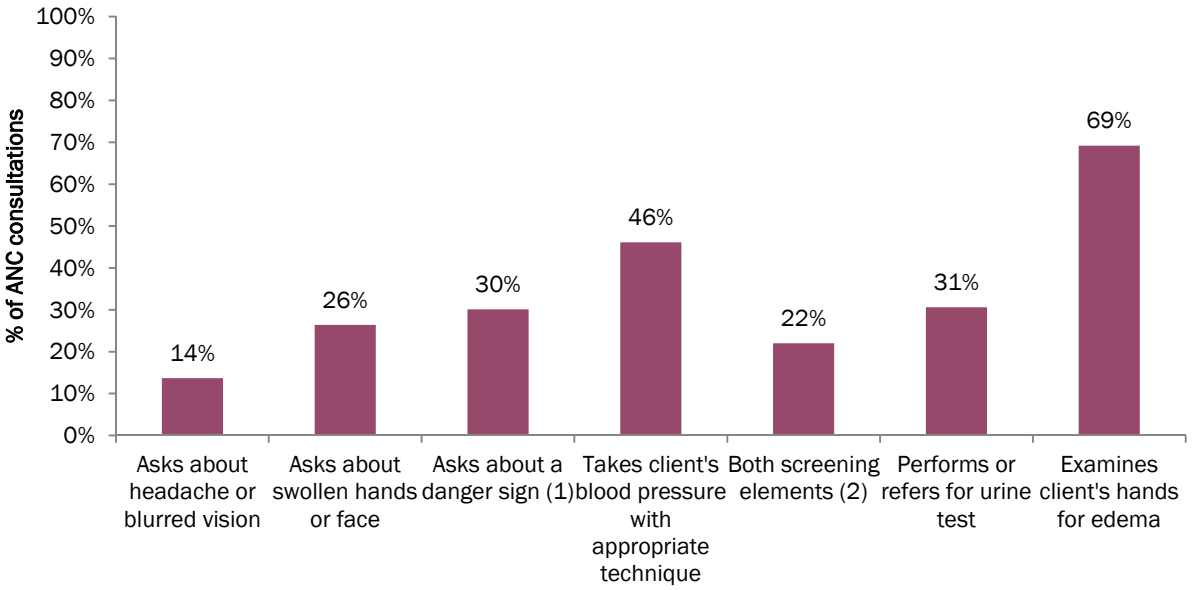
Pre-eclampsia and eclampsia (PE/E) are among the most dangerous complications of pregnancy. Eclampsia (the advanced stage of this disorder) is a major cause of maternal deaths.

Adherence to screening standards for pre-eclampsia

To date there are no accepted routine interventions to prevent pre-eclampsia, although both calcium supplementation among women with low calcium levels and aspirin supplementation appear promising. Nevertheless, clinical experience suggests that early detection and treatment of pre-eclampsia is beneficial to the woman and fetus because it permits clinical monitoring and prompt therapeutic intervention for cases of severe pre-eclampsia or eclampsia. Studies to date have indicated an inverse relationship between the quality of prenatal care and the incidence of eclampsia, strengthening the value of early detection (Chesley 1953; WHO 2003).

Adherence to screening steps for pre-eclampsia was assessed against three criteria, including two core functions (accurate blood pressure measurement and urine test for proteinuria) and one additional function (risk assessment). These criteria were selected based on the available evidence on effectiveness and are in line with the WHO ANC manual (WHO 2006a).

Figure 6.4 Completion of pre-eclampsia screening tasks during ANC consultations



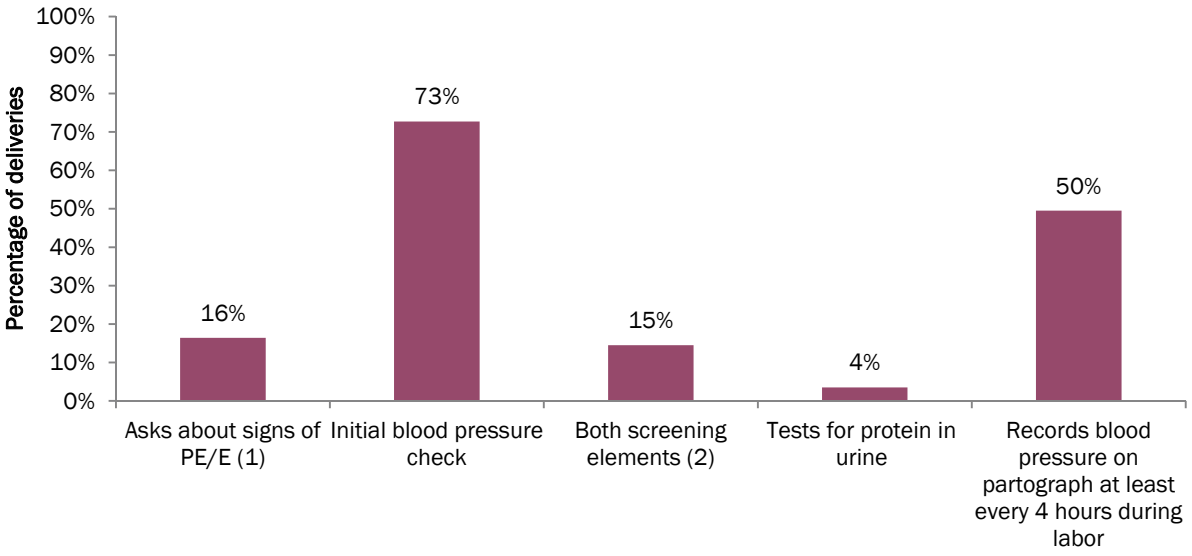
[1] Either asks about headache/blurred vision or asks about swollen hands/face
[2] Asks about a danger sign and takes client's blood pressure with appropriate technique

Approximately 92% of health workers took the client's blood pressure, but less than half performed this key screening test with the appropriate recommended technique—namely, measuring blood pressure in a sitting or left lateral position (83%) with arm at the level of the heart and an appropriate-sized cuff (49%). Accurate measurement of blood pressure should be a standard practice and the fact that so few providers performed the task correctly is cause for concern. Further investigation is warranted since this is such a fundamental skill that affects many areas of health care provision. The recommendation for urine testing for protein has been in flux in recent years. However, it remains an important screening test for pre-eclampsia, and recommendations have been made for universal testing for proteinuria at each ANC visit (National Collaborating Centre for Women's and Children's Health 2003). During observations, testing urine for albumin was conducted in just 31% of ANC clients. It was not immediately clear whether the low level of adherence was attributable to lack of facility guidelines or lack of knowledge.

Although not as sensitive an indicator as blood pressure measurement or a urine protein test, the study also assessed whether or not clients were asked about current symptoms of PE and examined for edema, symptoms very important in alerting health workers to perform a thorough examination. On the positive side, almost 70% of health workers checked client's hands for swelling. However, less than a third of mothers were asked about swollen hands or face and headaches or blurred vision. This represents a lost opportunity for prevention, detection and/or early management of this potentially life-threatening condition.

Pre-eclampsia can appear at any time during pregnancy, including during labor. It is thus recommended that the initial evaluation of mothers in labor should be thorough and provide detailed information on maternal, fetal and labor status. Figure 6.5 below shows the percentage of women receiving intrapartum-related PE/E screening during their initial assessment upon arriving in labor.

Figure 6.5 Completion of pre-eclampsia/eclampsia screening tasks during labor

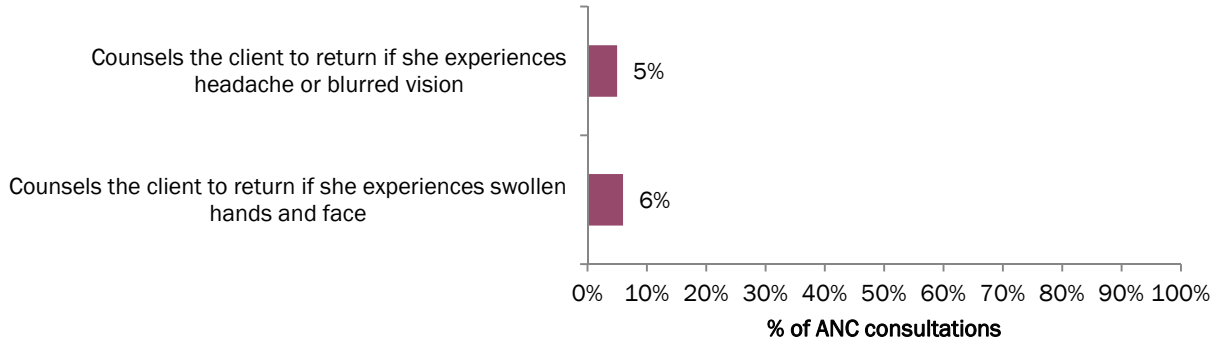


[1] Asks about headaches/blurred vision or swollen face/hands or convulsions/loss of consciousness (at least one sign)
[2] Asks about a danger sign and takes client's blood pressure

The quality of initial intrapartum care was found to be relatively adequate only with regard to checking the client's blood pressure (73%). Tasks such as measurement of protein in the urine and inquiries about PE/E-related symptoms were not performed for the majority of laboring mothers. However, half of the clients had their blood pressure recorded on the partograph at the correct interval.

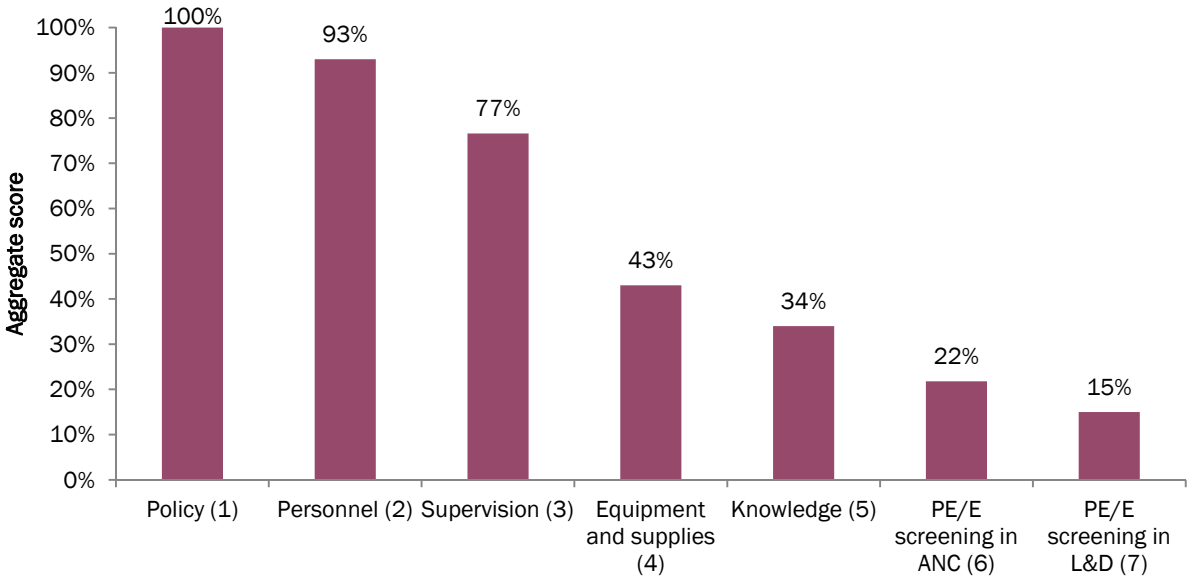
Pregnant women should be informed of the danger signs of pre-eclampsia and eclampsia because expectant mothers' early recognition of symptoms may improve the chances of timely treatment and survival (National Collaborating Centre 2003). In view of this, providers' adherence to PE/E-related pregnancy counseling during ANC was evaluated using two symptoms that might indicate the occurrence of pre-eclampsia.

Figure 6.6 Provision of ANC counseling on danger signs of pre-eclampsia



Only 8% of the women observed during antenatal care were counseled how to recognize danger signs of pre-eclampsia, Women were rarely given information on how to recognize edema. This is a cause for serious concern because edema is often the only clinical signs of pre-eclampsia that women can readily identify. Furthermore, given that headache is a common symptom of many diseases and consequently is taken for granted by the majority of expectant mothers, failure to provide education on this important early warning sign also must be addressed to decrease undue delays in detecting pre-eclampsia.

Figure 6.7 From policy to practice: constraints analysis for pre-eclampsia/eclampsia screening



1 See Table 4.1. Mean score of: magnesium sulfate registered, on EDL, PE/E screening in SDGs, magnesium sulfate first line in SDGs, in SDLs, all L&D health providers eligible to give magnesium sulfate
[2] Percentage of births attended by a skilled birth attendant
[3] Percentage of personnel received supervision in last three months
[4] Availability of magnesium sulfate in facilities
[5] Score for knowledge of PE/E
[6] See Figure 6.4
[7] See Figure 6.5

Although policy is supportive of the use of magnesium sulfate as the first-line drug in PE/E, less than half of the facilities had it in stock. Knowledge scores and observed practice of PE/E screening in ANC and L&D were low, indicating a need to raise the awareness among policy leaders and health providers of the need to address the many missed opportunities to prevent this deadly disease.

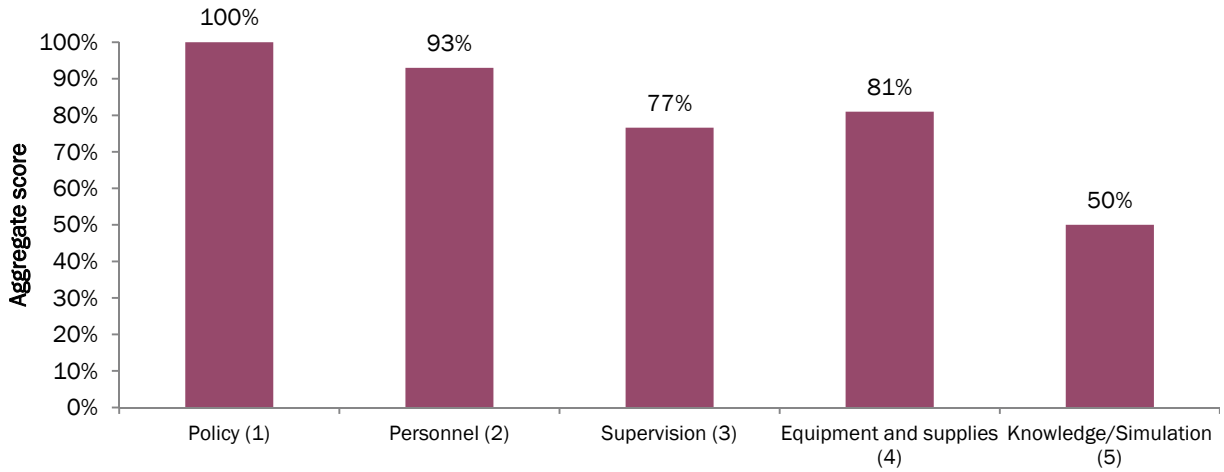
Severe pre-eclampsia and eclampsia treatment practices

Data collectors did not observe any cases of pre-eclampsia or eclampsia. This translates to an incidence of less than 1%, which is lower than expected. The reasons for this may be related to sample size and the fact that the observers stayed in each facility for only two days. Alternatively, it may indicate that health providers are failing to identify cases.

6.4 MANAGEMENT OF BIRTH ASPHYXIA (NEWBORN RESUSCITATION)

Neonatal deaths account for more than two-thirds of infant deaths globally. Neonatal asphyxia and infection account for 29% and 34% of the deaths, respectively (Lawn, Cousens and Zupan 2005). The adoption of simple and low-cost practices of resuscitation improves the outlook for asphyxiated newborns, even in poor communities.

Figure 6.8 From policy to practice: constraints analysis for newborn resuscitation



[1] See Table 4.1. SDGs include newborn resuscitation.
[2] Percentage of births attended by a skilled birth attendant
[3] Percentage of personnel received supervision in last three months
[4] Percentage of facilities with infant sized bag and mask
[5] Mean percent score for knowledge of newborn resuscitation based on knowledge of equipment and supplies and observed simulation with NeoNatalie doll (see Figure 4.2 and Appendix Table D)

The scores for provision of key elements of care for asphyxiated newborns were relatively high. Many facilities had the necessary equipment and supplies to perform newborn resuscitation, and on average, half of health workers performed appropriate actions during the NeoNatalie simulation. However, the simulation was difficult to score and may not predict how providers would perform when faced with a real case of asphyxia.

Observed management of newborn asphyxia

Forty-two cases of neonatal asphyxia case management were observed. Four newborns (9%) died. Treatment details are provided in Table 6.4.

Table 6.4 Quality of care in neonatal asphyxia case management

NUMBER OF CASES[1]	TREATMENT	OUTCOME
42 not breathing at birth	42 received stimulation	22 started breathing
20 not breathing after stimulation	19 received bag & mask ventilation 1 received no bag & mask ventilation (very premature baby)	12 recovered normal breathing with bag & mask; 2 were ventilated with oxygen and recovered; 1 was ventilated with oxygen and did not recover 6 died

[1] Records indicated 44 cases in which the baby was not breathing at birth; only 42 of those cases were observed during resuscitation.

Some form of stimulation (dry and wrap, position, suctioning of the mouth and/or nose) was performed in all resuscitation cases, and 19 cases were treated with a bag and mask when stimulation measures did not lead to spontaneous breathing. A small number of newborns (3 of 42) were ventilated with oxygen. In five cases, ventilated newborns failed to recover breathing. The sixth death occurred in a very premature, very low birth weight baby in which lifesaving measures appear to have been withdrawn.

7. Discussion and Conclusions

The quality of service provided to ANC and L&D clients for the prevention, early detection, and treatment of common maternal and newborn complications appears to be mixed, ranging from very low in some aspects to up-to-standard in others. Overall, the care provided fell below the standards recommended in WHO's evidence-based protocols and guidelines, and this low quality was observed across all levels of facilities. On the other hand, the study found a high level of adherence to some care practices, including some of the initial assessment tasks for labor and delivery, initiation of partograph (70%), several key infection prevention practices, correct use of uterotonics during third stage of labor as part of AMTSL (though administration of the drug was delayed), blood pressure screening for pre-eclampsia and immediate drying of newborns and dry cord care (components of essential newborn care).

There may be multiple interrelated reasons for the observed low quality of care, but the major factor appears to be providers' lack of knowledge and/or skills to perform high-impact, evidence-based interventions. Although Rwanda's service delivery guidelines were updated as recently as 2008 and are available at national level, only 36% of facilities had the guidelines for normal delivery and only 27% had the guidelines for emergency obstetric care. In some cases, all the elements of facility readiness were in place, and practice was still observed to be inadequate. For example, while the drugs and supplies for administering oxytocics (to prevent and manage PPH) were readily available at most facilities (85–96%), the aggregate knowledge score of providers in this area was only 40%, and only 7% actually performed all the steps of AMTSL, including uterine massage, correctly. For newborn resuscitation, scores for personnel, supervision and equipment and supplies were quite high, but the overall skills and knowledge score was only 50%. While training could be a factor, there may also be other less tangible barriers such as motivational or attitudinal barriers (that is, health care workers or their supervisors being unconvinced of the advantage of a particular standard of care) or the organization of care, which were not explored here.

The availability of essential equipment and supplies appears to be largely adequate, making it unlikely that this is the major cause of the overall observed low use of recommended practices. However, magnesium sulfate, the drug of choice for treating PE/E, was available in only 43% of facilities, which suggests one reason that women are not being properly treated for this important cause of maternal morbidity and mortality. Discussion with the Ministry of Health officials suggested that this situation was corrected after the data collection and that magnesium sulfate now is available in almost all health facilities in Rwanda. In addition, although the percentage of providers adhering to infection prevention practices were quite high, the sterilization capacity score of 59% means that more than 40% of the institutions reviewed were not meeting standards for sterile equipment.

Almost 90% of the 40 hospitals assessed for L&D inventory had the supplies, equipment and personnel to conduct cesarean sections, and all hospitals had performed cesarean sections in the last three month. Of the 293 deliveries observed, 52 ended in cesarean section, an 18.7% cesarean section rate. This is higher than normal but could indicate that these institutions are receiving referral cases from health facilities that are not equipped to manage cesarean sections.

The deficits identified pose serious threats to the health of Rwandan women and newborns, and they greatly hinder achievement of MDGs 4 and 5. Additional strategies and interventions to reduce the observed deficits in care, and ultimately to increase the quality and availability of high-impact interventions, are urgently needed.

A summary of key findings and conclusions is presented below.

General:

- Designated skilled attendants (doctors, nurses and midwives) attended 93% of deliveries, and midwives/nurses attended the majority (88%).
- Improvements are needed on very basic tasks such as taking pulse, temperature and blood pressure and asking about danger signs during initial assessment of mothers in labor.
- Ineffective and potentially harmful practices were prevalent at a high rate.
- Although for the most part providers treated women with respect during labor, the overall mean score of 58% for this domain of care suggests that there is still room for improvement.

Supervision:

- More than three-quarters of the health workers reported being supervised in the last three months and supervisors appear to be taking an active role by observing care, providing feedback and supporting quality improvement strategies

Drug and Supply Logistics:

- Drugs and supplies for EmONC were generally available at the CAMERWA central warehouse, according to interviews and record review.
- Essential supplies were *not* available in all facilities assessed; 43% lacked all the needed supplies for normal delivery on the day of assessment. One of the missing supplies was a very basic and simple item—cord ties or clamps.

Health Worker Knowledge and Training:

- Knowledge scores on maternal complications were generally low, with a range of 34-42%. The score for knowledge of immediate newborn care was higher at 58%.

Antenatal Care:

- Although scores on some aspects of antenatal counseling were quite good (e.g., over half of providers explained the purpose or importance of iron and folate supplements), the overall score for health promotion during ANC was only 14%.
- Overall, providers were more likely to follow FANC guidelines for treatments at the first ANC visit (47%) than to perform the elements of FANC that required interaction and counseling with the client.
- Discussion of HIV status during ANC consults was quite high.

Postpartum Hemorrhage:

- Prevention of PPH using AMTSL (all components) was observed at 7% of births—a very low score that needs to be improved dramatically. The major gaps in administering AMTSL correctly appear to be in the timing of administration of the uterotonic and in performing controlled cord traction and uterine massage.
- Use of oxytocin for AMTSL is almost universal, but the dose was given within three minutes in only 56% of the observed cases. When correct dose and timing (≤ 1 minute) are included in the analysis, the rate of correct administration drops to 19%.

- The fact that less than half of all women received uterine massage indicates a lack of information/emphasis during training and/or a poor provider adherence.
- Knowledge scores for diagnoses and management of PPH were low, with an aggregate score of 40%. Given that postpartum hemorrhage is the most frequent cause of maternal death globally, these results are cause for serious concern.

Pre-eclampsia/Eclampsia:

- Blood pressure screening during ANC was performed using the correct technique in only 46% of the observed consultations.
- History taking for PE/E danger signs in both the ANC clinic and L&D ward was minimal.
- Although magnesium sulfate is the stated drug of choice for treating PE/E in Rwanda, only 43% of facilities had it in stock.

Obstructed Labor:

- Partographs were used in 70% of births, and almost facilities had partographs in stock (99%).
- Blood pressure was recorded on the partograph at four-hour intervals in 45% of labors.
- Recording of key information on partograph was incomplete in 55% of the labors observed.
- Cesarean sections were reported in all districts hospitals in the last three months. The cesarean rate during the observations of this study was approximately 19%.

Sepsis:

- Performance of IP practices in L&D was generally good (62%), but some IP practices were not universally followed (e.g., hand washing and appropriate cleaning of protective clothing).
- Nonindicated use of manual exploration of the uterus, a risk factor for maternal puerperal sepsis, and application of fundal pressure were both unacceptably high (14% of deliveries).

Immediate Newborn Care and Birth Asphyxia:

- Providers adhered to several important newborn care practices, but some thermal care elements, including skin-to-skin contact, and support for the initiation of breastfeeding during the first hour were observed in only half of deliveries or less.
- Needed equipment was available in almost all facilities.

8. RECOMMENDATIONS

8.1 OVERALL RECOMMENDATIONS

Policy and Guidelines:

- Disseminate and reorient providers to the *Formation continue en soins obstetricaux et neonatals d'urgence de base* (SONU-B) at all health facilities.
- Standardize data collection tools at the facility level and disseminate practical tools that can help providers with recordkeeping and decision-making.

- Update the national guidelines and integrate the use of misoprostol at the community level by community health workers. This provides an excellent opportunity to promote AMTSL at lower levels, extending uterotonic protection and PPH prevention to all women.
- Because some hospitals seem to be overloaded, the ministry of health should adopt a policy for resource allocation for maternal and child health services that is based on the number of expected deliveries in the catchment areas.

Capacity-Building/Training:

- Overall, both pre-service training and in-service training are needed in the areas of maternal and child health.
- Pre-service training should emphasize the importance of patient counseling during ANC and cover maternal and newborn nutrition, including immediate breastfeeding, family planning, and PE/E screening.
- Pre-service and in-service training should have a stronger emphasis on PE/E history taking, use of the partograph for tracking blood pressure, and magnesium sulphate as treatment of choice. Pre-service and in-service training for skilled birth attendants needs to address practices that are not beneficial.
- Further emphasis is needed on accurate completion of the partograph as a tool for monitoring and decision-making during labor.
- District-level supervisors should also be trained in these topics so they can provide quality supervision to their supervisees.

Drug and Supply Logistics:

- Magnesium sulfate should be made available at all health facilities that offer EmONC services.
- Facilities should maintain effective procedures for procurement and distribution of key EmONC drugs and supplies, including oxytocin and misoprostol, at both the facility and community levels.

Monitoring and Evaluation:

- Further study is needed of the reasons for missing information on the partograph.
- Institute maternal and perinatal death audits in facilities where they are not performed.
- Consider including in the MNH monthly HMIS facility reports at least one quality of care indicator for each serious MNH complication.

8.2 COMPLICATION-SPECIFIC RECOMMENDATIONS

Prevention and Early Treatment of PPH:

- Train and retrain skilled birth attendants on AMTSL as well as early and key treatment functions:
    - Since provision of uterotonics in the third stage of labor was found to be up to standard, training should emphasize other AMTSL components, such as the importance of timing of the dose of oxytocin, the benefits of uterine massage and skills related to controlled cord traction. Ensure that training on manual removal of the placenta focuses on the importance of adhering to critical steps—specifically, starting IV fluids and providing analgesics before the procedure.

- Use mannequins for hands-on training in lifesaving skills—namely, bimanual compression and aortic compression—because knowledge in this area is below average. In addition, introducing other alternative management methods for intractable hemorrhage, such as the Bakari balloon, would further help to improve capacity with regard to PPH management.
- Training initiatives should give priority to providers who carry out the majority of deliveries (midwives and nurses) and to facility levels where the application of AMTSL and early treatment components are expected to have the biggest benefit (e.g., for health facilities that lack the supplies or human resources to provide advanced management of PPH).
- Increase key counseling messages for women to help them recognize PPH-related danger signs.
- Use information, education and communication strategies to eliminate practices that are likely to increase the chances of PPH. (Note that unnecessary episiotomies were observed in 14% of deliveries and stretching of the perineum in 21%.)
- Provide job aids, including quick reference guidelines on key tasks. Make protocols for AMTSL, PPH management and early treatment available in all labor wards.

- Improve facility readiness:
  - Make sure that uterotonics are available at all times and in all facilities providing delivery services. Uterotonics were present in 88% of facilities, which is an indicator of the presence of an excellent uterotonic drug management system, including dedicated finance. However, uterotonics were absent in eight of the visited facilities. In lower-level facilities, misoprostol could be used for AMTSL if provision of oxytocin is problematic.

Prevention of Severe Pre-eclampsia and Eclampsia:

- Train providers on screening for pre-eclampsia during antenatal visits as well as on admission during labor.
  - Emphasize taking blood pressure with correct technique during each ANC visit.
  - Emphasize testing urine for protein as mandatory in each of the four ANC visits.
  - Emphasize counseling clients on danger signs for PE/E.
- Ensure that magnesium sulfate is available at all facilities providing delivery care and ensure that these facilities are staffed by skilled birth attendants trained in its use.
- Improve service delivery by incorporating urine testing for protein along with services that are currently being completed before examination or consultation.

Prevention of Obstructed Labor and Its Sequelae:

- The disparity between the level of partograph use and the proportion of providers reporting that they were trained in partograph use, as well as its presence in pre-service curriculum, indicates a need for improvement strategies beyond simple training. Although use of a partograph was initiated in a high proportion of deliveries (70%), the proportion of deliveries in which the partograph was properly completed was much lower. We recommend that an in-depth study be undertaken to understand the causes of the low completion rate.

Prevention of Sepsis:

- Providers need to improve their hand washing practices before examining the client.
- Nonindicated use of manual exploration of the uterus, which was found to be unexpectedly high, should be discouraged through appropriate educational strategies and supervision.

Essential Newborn Care and Prevention and Treatment of Newborn Asphyxia:

- Several aspects of immediate newborn care need improvement, particularly the health worker's role in promoting skin-to-skin contact and early initiation of breastfeeding

Cross-Cutting Areas:

- Evaluate and strengthen the curriculum for Bachelor of Science (B.Sc.) level nurses to improve their skills and knowledge for provision of ANC, L&D and postnatal care.
- Ensure that a mechanism is in place to facilitate the rapid and effective implementation of evidence-based service delivery guidelines.
    - Ensure that due consideration is given to overcoming resistance to guideline adherence.
    - Ensure copies of guidelines are in place at each facility.
    - Ensure supportive supervision for evidence-based practice and guideline adherence.
- Consider including in the MNH routine facility reports at least one quality of care indicator for each of the serious maternal complications (e.g., use of magnesium sulfate in management of PE/E and administration of an uterotonic in the third stage of labor).

General and System-Level Recommendations for the Ministry of Health:

- The high rate of initiation and the low rate of completion of the partograph, which was observed in almost all facilities, conflicts with the high level of partograph use reported by the supervisors of the PBF evaluation scheme. There is strong suspicion that providers may complete partographs after delivery and before the supervisor's visits. Including some observation of the actual delivery by the PBF supervisors may be helpful.
- Provide training for specific management of labor and delivery to PBF and other supervisors of the districts.
- Reorganize the referral and counter-referral system between the health center and district hospitals.
- Reduce the delay in decision-making at both health centers and district hospitals.
- Make use of ambulances more effectively by training people who receive calls from the health centers. There are reports that sometimes ambulance drivers or others who are not trained as health providers take calls from health centers and make decisions about whether cases are urgent or not.

Appendix

Table A. Health facilities assessed and numbers of expected and observed deliveries

FACILITY TYPE	IDENTIFIER	REGION	NUMBER OF DELIVERIES OBSERVED	NUMBER OF DELIVERIES EXPECTED OVER TWO DAYS
District Hospital	A	East	5	13
District Hospital	B	East	5	17
District Hospital	C	East	5	12
District Hospital	D	East	6	7
District Hospital	E	East	7	11
District Hospital	F	East	5	10
District Hospital	G	East	6	9
District Hospital	H	East	8	16
District Hospital	I	East	4	10
District Hospital	J	Kigali	5	41
District Hospital	K	Kigali	5	17
District Hospital	L	Kigali	5	13
District Hospital	M	Kigali	9	8
District Hospital	N	North	5	6
District Hospital	O	North	5	12
District Hospital	P	North	5	6
District Hospital	Q	North	7	26
District Hospital	R	North	6	8
District Hospital	S	North	6	10
District Hospital	T	South	17	14
District Hospital	U	South	3	3
District Hospital	V	South	3	7
District Hospital	W	South	5	4
District Hospital	X	South	10	10
District Hospital	Y	South	4	3
District Hospital	Z	South	5	6
District Hospital	AA	South	5	10
District Hospital	BB	South	5	20
District Hospital	CC	South	5	7
District Hospital	DD	South	5	7

FACILITY TYPE	IDENTIFIER	REGION	NUMBER OF DELIVERIES OBSERVED	NUMBER OF DELIVERIES EXPECTED OVER TWO DAYS
District Hospital	EE	West	5	7
District Hospital	FF	West	4	5
District Hospital	GG	West	5	2
District Hospital	HH	West	5	11
District Hospital	II	West	5	19
District Hospital	JJ	West	5	4
District Hospital	KK	West	5	6
District Hospital	LL	West	5	6
District Hospital	MM	West	6	7
District Hospital	NN	West	7	10
District Hospital	OO	West	8	10
District Hospital	PP	West	5	9
Health Centre	A	East	3	2
Health Centre	B	East	3	3
Health Centre	C	East	*Not observed*	
Health Centre	D	East	2	2
Health Centre	E	East	3	2
Health Centre	F	East	2	2
Health Centre	G	East	1	3
Health Centre	H	Kigali	*Not observed*	
Health Centre	I	Kigali	3	10
Health Centre	J	Kigali	1	1
Health Centre	K	North	3	4
Health Centre	L	North	1	1
Health Centre	M	North	1	1
Health Centre	N	North	*Not observed*	
Health Centre	O	North	*Not observed*	
Health Centre	P	South	*Not observed*	
Health Centre	Q	South	3	2
Health Centre	R	South	*Not observed*	
Health Centre	S	South	4	2
Health Centre	T	South	2	2
Health Centre	U	South	3	3

FACILITY TYPE	IDENTIFIER	REGION	NUMBER OF DELIVERIES OBSERVED	NUMBER OF DELIVERIES EXPECTED OVER TWO DAYS
Health Centre	V	South	1	2
Health Centre	W	South	3	1
Health Centre	X	West	1	2
Health Centre	Y	West	*Not observed*	
Health Centre	Z	West	3	2
Health Centre	AA	West	*Not observed*	
Health Centre	BB	West	3	2
Health Centre	CC	West	3	2
Health Centre	DD	West	3	8

Table B. Availability of infection prevention commodities

INFECTION CONTROL ITEMS IN THE DELIVERY ROOM	PERCENTAGE OF FACILITIES (n=69)
Soap for hand washing	77%
Water for hand washing	100%
Piped water or bucket with tap	91%
Soap and piped water/bucket with tap	71%
Sharps container	97%
Already mixed decontaminating solution	99%
Clean (or sterile) gloves	87%
Mean percentage score for infection control*	88%

* Soap and piped water/bucket with tap, sharps container, already mixed decontaminating solution, clean (or sterile) gloves

Table C. Availability of sterilization commodities

STERILIZATION ITEMS	PERCENTAGE OF FACILITIES (N=69)
Functioning electric autoclave	60%
Functioning non-electric autoclave	19%
Functioning electric dry heat sterilizer	52%
Functioning electric boiler or steamer	12%
Non-electric pot with cover AND functioning heat source	11%
Functioning automatic timer	57%
TST indicator strips	35%
Capacity for sterilization	
Functioning electric or non-electric equipment for sterilization*	94%
Functioning automatic timer or TST indicator strips	62%
Written protocols or guidelines for sterilization or disinfection	19%

Mean percent score for sterilization capacity	59%

* Electric autoclave, or electric dry heat sterilizer, or electric boiler or steamer, or non-electric pot with cover and heat source

Table D. Health workers' knowledge of newborn resuscitation

BASIC EQUIPMENT AND SUPPLIES NEEDED FOR IMMEDIATE NEWBORN CARE	PERCENTAGE OF HEALTH WORKERS (n=146)
Two dry warm towels or cloths	36%
Self-inflating ventilation bag	55%
Newborn face mask, size 1	59%
Newborn face mask, size 0	43%
Mucus extractor/suction/bulb syringe	76%
Sterile disinfected clamps, scissors and cord ties	22%
Flat surface with warm cloth	29%
Clock or watch with seconds	14%
Source of warmth: heating lamp	59%
Mean percent score (equipment and supplies)	44%
Newborn simulation with NeoNatalie	
Stimulation: dry baby; place on warm clean surface, head in slightly extended position; suction with bulb or catheter in mouth or nose (all items)	44%
Ventilation: place correct size of mask covering chin, mouth and nose; squeeze bag with two fingers or hand, appropriately; ventilate at 40 breathes/minutes (all items)	34%
Adjustment is any proper adjustment: check neck position, check seal, repeat suction, squeeze harder	79%
Aggregate score for newborn resuscitation knowledge*	50%

* Mean of scores for equipment and supplies, stimulation, ventilation, adjustment

Table E. Health workers' knowledge of pre-eclampsia/eclampsia identification and management

SECTION 1: ASSESSMENT & DIAGNOSIS	PERCENTAGE OF HEALTH WORKERS WITH CORRECT RESPONSE (n=146)
Examination actions	
Record time of onset of present symptoms	35%
Assess level of consciousness	24%
Assess for any convulsions	24%
Check vitals	85%
Listen to/assess fetal heart tones	51%
Check urine protein	55%
Working diagnosis	
Severe pre-eclampsia	90%
Mean score for assessment & diagnosis	**52%**

SECTION 2: INITIAL INTERVENTIONS	
Action to take	
Stabilize with magnesium sulfate and antihypertensives	46%
Action to take immediately for convulsions	
Administer oxygen at 4–6L per minute	14%
Place in side-lying position	22%
Protect from injury	25%
Give magnesium sulfate	41%
Provide antihypertensives	31%
Mean score for initial interventions	**30%**
SECTION 3: ESSENTIAL EQUIPMENT AND SUPPLIES MUST BE AVAILABLE AT THE REFERRAL FACILITY	
IV with normal saline or Ringer's lactate	53%
Urinary catheter and urinary bag	27%
Patellar hammer	7%
Suction machine & catheter	30%
Oxygen & adult mask	50%
Injectable magnesium sulfate	61%
Calcium gluconate	16%
Injectable antihypertensives	42%
Mean percent score (equipment)	**36%**
SECTION 4: ACTION TO TAKE 1 HOUR LATER	
Repeat magnesium sulfate 4 hours after last dose if reflexes and respiration are normal	15%
Maintain diastolic blood pressure between 90 and 100 with antihypertensives	27%
Monitor labor and begin partograph	39%
Auscultate lungs hourly	6%
Record fluid intake and output hourly	12%
Get and record respirations, reflexes and patellar reflexes hourly	10%
Mean percent score (exam actions)	**18%**
Aggregate knowledge score for PE/E case study	**34%**

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