

Scoping report on neonatal care provision in the perinatal period at the University Teaching Hospital (UTH) Lusaka to inform the development of a neonatal course

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A dedication to the late Hon. Charles C. Manyema first Solicitor General of the Republic of Zambia, subsequently Secretary to the Cabinet and His Excellency Ambassador to Germany and Austria, my beloved father; and to my dear mother the late Magistrate Eustella JB Manyema, who invested their hard work and lives to enhance the welfare of Zambia - my teachers and role models. May the insights you shared and lessons you taught continue to live on.

A list of main stakeholders is available on request.

Glossary of terms

Ambu bag – proprietary name for ‘self-inflating bag’ a hand-held device commonly used to provide positive pressure ventilation to patients who are not breathing or not breathing adequately.

Cardiotocography (CTG) – a technical means for recording fetal heartbeat and uterine contractions during pregnancy

Cephalopelvic disproportion (CPD) - when the baby’s head or body is too large to fit through the mother’s pelvis to be born.

Continuous positive airway pressure (CPAP) – a treatment that uses mild air pressure to keep the airways open.

Early Skin to skin contact - after the birth the baby is dried and placed naked on the mother’s chest and covered with a towel and head cap to keep warm. This has numerous benefits for the baby including warmth, stabilizes the heart and breathing patterns and encourages breast feeding.

Ex-utero transfer - where the baby is transferred to another institution after birth.

Fresh still birth (FSB) - a baby born dead after 24 completed weeks of pregnancy, where death occurs during delivery.

Hands on approach at birth – refers to the application of one hand on the perineum whilst the other hand facilitates flexion and slow delivery of the fetal presenting part at birth

Intrapartum – relating to the period during childbirth

In-utero transfer - the transfer of the mother to another hospital for maternal care or predicted neonatal care for her newborn(s)

Lying-in ward - intended for use during childbirth; in this case before or after birth.

Macerated still birth (MSB) - a baby born dead after 24 completed weeks of pregnancy where death occurred in pregnancy

Perinatal – pertaining to the time immediately before and after birth

Pinard stethoscope – a traditional tool used by midwives to listen to the baby’s heartbeat.

Pre-eclampsia – a condition in pregnancy characterised by high blood pressure, protein in the urine and fluid retention

Term - 37 to 42 completed weeks of pregnancy

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1. Introduction

This report shares the processes and outcomes of a small scoping exercise that took place at the University Teaching Hospital (UTH) Maternity and Neonatal Units to inform the need for the development of a neonatal course. It was undertaken by Canterbury Christ Church University representative under the auspices of the Brighton-Lusaka Health Link.

2. Background

The United Nations (UN) Millennium Development goals 4 and 5 continue to emphasise a commitment to reducing child mortality and improving maternal health (UN 2015). Whilst overall global child mortality rates have reduced considerably, concern remains in regard to the comparatively slow pace in the decline of neonatal deaths (Central Statistical Office (CSO) 2015; World Health Organisation (WHO) 2014; Bhutta et al 2014). Several papers and policy documents have been developed to further strengthen efforts to improve neonatal care, including 'Every Newborn: an action plan to end preventable deaths' (WHO 2014) and the development of signal functions for neonatal care defining standards for routine and emergency newborn care in low income countries (Gabrysch et al 2012). Zambia, a landlocked country with a population of about 13.1 million according to the 2010 census (CSO 2015) is located in the sub-Saharan African continent which, with South Asia, reports amongst the highest neonatal mortality rates worldwide (Chisunka 2013).

According to Zambia Demographic and Health Survey 2013-14 (CSO 2015) the neonatal mortality rate in Zambia currently stands at around 24 per 1000 live births 2009-13 and even though there appears to be an overall decline in neonatal mortality this is at a significantly slower pace than that of childhood mortality rates signaling the need for intervention. Bates' recent work looking at morbidity and mortality rates in the Neonatal Intensive Care Unit (NICU) UTH Lusaka expressed concerns about the high neonatal mortality rates (50%) related to sepsis (Bates 2014).

Efforts to foster improvements in neonatal health and care have been supported by various actions including the Zambian government's Newborn Health Framework scale-up (2013) which articulates priority areas for intervention and the recognition of WHO 'Essential Newborn Care guidelines' (WHO 2010).

Brighton-Lusaka Health link, sponsored by the Tropical Health and Education Trust (THET) have responded to the need by pioneering the first paediatric nursing school in Zambia, training nurses to provide quality paediatric care. To advance this even further it is intended that neonatal care aspects will be added to the curriculum in keeping with the national and global agenda to reduce neonatal morbidity and mortality (Chisunka 2013, WHO 2014). Demonstrating a clear commitment in this regard a stakeholder's meeting was convened in September 2015 at the Lusaka School of Nursing to discuss the development of a course to train staff in the provision of neonatal care. Amongst the attendees were representatives from the Zambian Ministry of Health, General Nursing Council, senior paediatric and nursing research and clinical staff from the UTH, Educationalists from the Lusaka School of Nursing, Brighton-Lusaka Health Link and Canterbury Christ Church University. I describe a scoping exercise that will help inform and contribute to the planning and development of the proposed neonatal course. Primarily from a midwifery perspective with experience in Newborn Life Support and additional training in the examination of the newborn, I will provide insights mainly at the maternal-neonatal interface. Some

elements related to interaction between the maternity and neonatal units and aspects of care in the neonatal unit have also been included. Relevant scoping questions in section 4 related to the neonatal unit were prepared by my colleague Susan Simmons, senior lecturer in neonatal nursing Brighton University.

The aim of the scoping exercise was to ascertain current practice regarding the care provided for the newborn around childbirth and the immediate post-natal period in order to identify strengths and gaps, thereby facilitating the development of appropriate educational interventions responsive to local needs.

3. Methodology

Three main methods were used in the scoping exercise: Observation, interviews and discussions, and reviews of documents.

3.1 Observation

Observation of neonatal care was undertaken over a period of about 7 hours divided between 2 shifts on two separate days in the following areas:

- Labour ward
- Post natal ward
- Neonatal unit

Clinical practice around childbirth and the immediate postnatal period was observed through shadowing members of staff on the labour and postnatal wards.

3.2 Interviews

This included both formal interviews ($n=4$) and additional informal conversations with both junior and senior clinical staff. A staff questionnaire (Appendix B) was used to obtain an overview of knowledge and understanding of key elements of routine and emergency neonatal care. Main objectives and outcomes of the aforementioned initial stakeholder meeting held around the time of the scoping visit are also addressed within section 4.

3.3 Document reviews

Relevant documents reviewed included the following:

- Clinical guidelines
- Records of clinical activity
- Patient records
- Curriculum documents
- Presentations from stakeholders' meeting

A list of publications and sources used in the literature overview is available in the reference list.

Ethical considerations

To ensure that the scoping exercise adhered to ethical principles, review and approval was obtained from the ethics committee at Canterbury Christ Church University. This acknowledged the existing Memorandum of Understanding in the Health Link partnership between Brighton and Lusaka. In addition relevant permissions were also appropriately granted by the Chief Nursing Officer UTH with the supported of Principal Nursing Education Officer of the Lusaka School of Nursing, UTH.

4. Findings & Limitations

This section provides a summary of the outcomes from the scoping activity and an acknowledgement of limitations. Areas of concern are addressed in Section 5.

4.1 Observation:

A summary of findings is provided below mainly utilising elements within the framework created to guide the observation (Appendix C). The framework was adapted from the New Signal Functions for Routine and Emergency Newborn Care (Gabrysch et al 2012) which outlines the key elements by which health services' ability to provide emergency and routine newborn care is measured. Relevant aspects from the Needs Assessment Toolkit for Emergency Obstetric and Newborn Care (AMDD (Averting Maternal Death and Disability) Program (2010) have also been incorporated to encompass a wider perspective on the standards measured. Each numbered section in the table refers to a different element of the observed care. Information relevant to the description of the observation at the time has also been added.

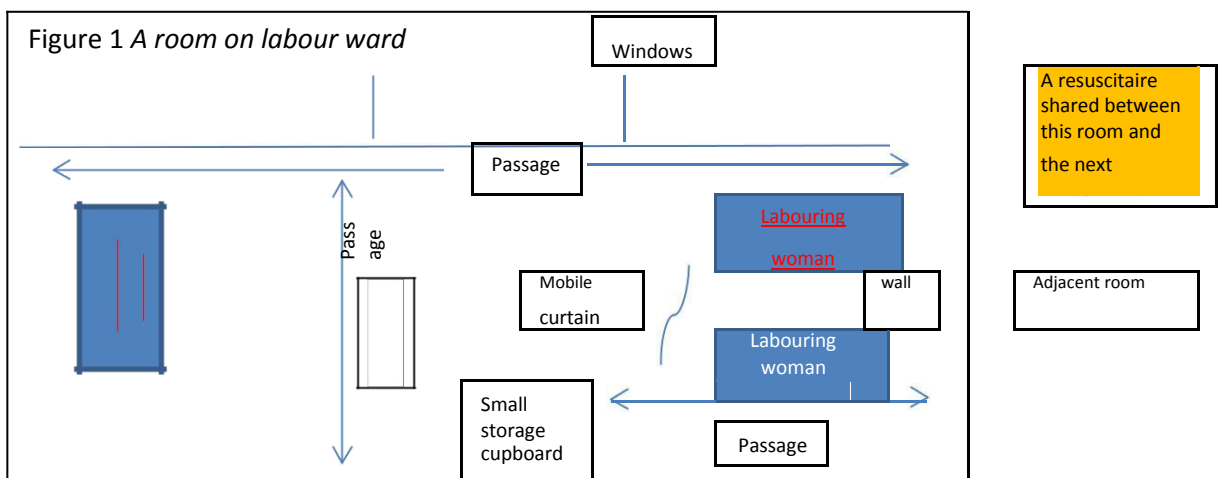
Table 1

Observation/shadowing on the maternity unit (labour ward and postnatal): delivery of maternal and newborn care (1)

Obstetric care including:

1. Staffing, equipment and facilities

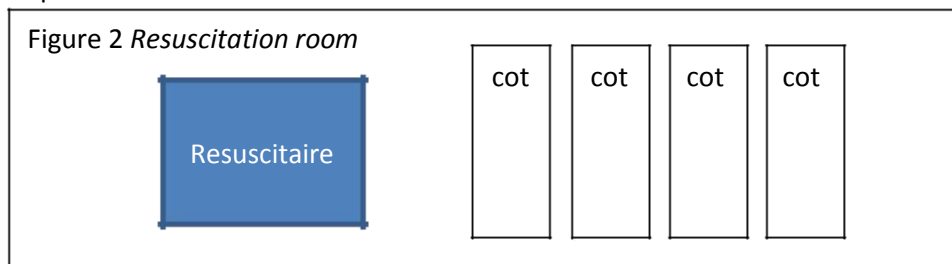
- Each shift was staffed by a 'crew' of 12 staff with one crew leader (usually based in the Special Observation Unit annex, and holding the key to the medicines cupboard). This was the expected standard for full staffing capacity; two midwives were in charge of the shift. The delivery suite is a 36 bedded unit with about 10 of these placed along the corridor with mobile dividing curtains.
- The rooms consist of a bay comprising 6 beds (see Figure 1). Staff allocation would sometimes be one midwife to 10 women depending on staffing levels. There was very little privacy between beds, a few mobile curtains with passages allowing staff to walk around freely, often whilst the woman was laboring or delivering.



Observation/shadowing on the maternity unit (labour ward and postnatal): delivery of maternal and newborn care (2)

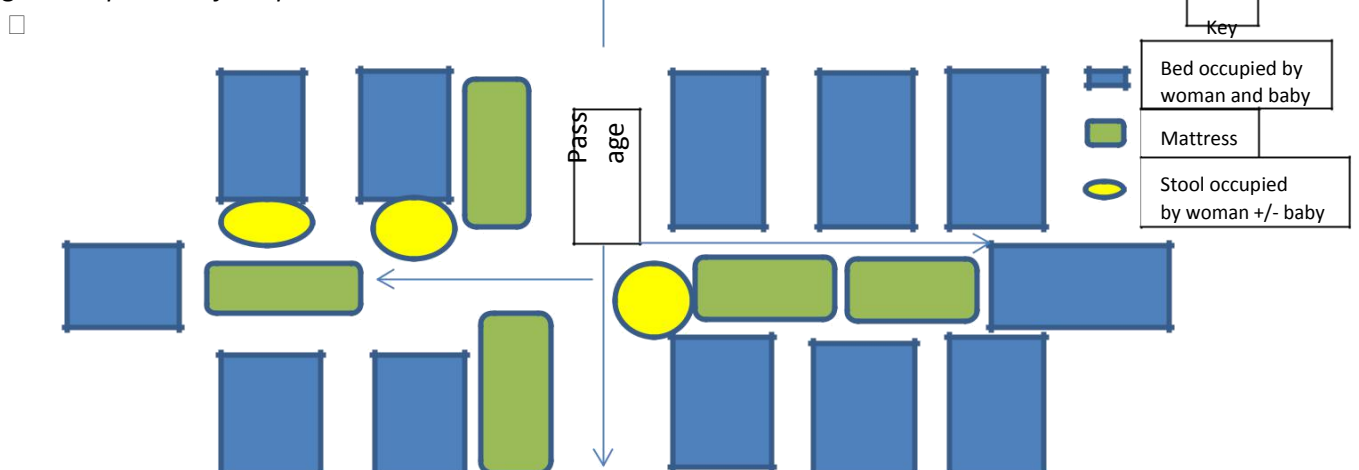
Obstetric care including:

- A Special Observation Unit (SOU) with four beds for women requiring close observation and high dependency care such as women with Pre-eclampsia, cardiac problems and massive hemorrhage. This is staffed by one midwife.
- A Special Observation Unit annex with spill over patients from the SOU with similar capacity and staffing.
- An Isolation room for women with infectious diseases such as tuberculosis and Measles.
- A resuscitation room with one resuscitaire and a few baby cots (Figure 2). Babies were brought here after delivery sometimes simply to be weighed and dressed and then placed in a cot for a period of time separated from their mothers.



- Equipment resources included the following: a cardiocography (CTG) machine (of which only one was available on the unit), an ultrasound scanner (of which one was available on the unit), an autoclaving machine for sterilising delivery equipment and a number of Pinard stethoscopes which was the standard method for fetal monitoring.
- Some guidelines were displayed on the walls in the rooms and along the corridor, for example, on the management of postpartum hemorrhage, eclampsia, and maternal HIV positive status, the use of the partogram and newborn resuscitation.
- An equipment room with bags of intravenous fluids and relevant charts for documentation.
- A lying in ward which admitted both antenatal and postnatal women and their babies, with a 36 bed capacity. However, at the time of observation 54 mothers were counted, of which about two thirds were postnatal. Women who had a caesarean section delivery were admitted to a side room which accommodated two beds. Figure 3 illustrates a portion of the postnatal ward at the time of observation. Each mattress on the floor was occupied by about two to three women sometimes with their babies.

Figure 3 A portion of the postnatal ward



Observation/shadowing on the maternity unit (labour ward and postnatal): delivery of maternal and newborn care (3)

Obstetric care including:

2. Infection Control

There was a high occupancy and turnover rate of women and babies on the wards, with only a few staff to manage care. There was hardly any decontamination undertaken by staff between patients when providing care such as handwashing or appropriate hand gel.

3. Monitoring and management of care during labour and delivery

A 38 weeks pregnant woman in labour.

She was lying on the bed and although she would occasionally come off the bed and kneel or squat during a contraction, the midwife advised her to stay in bed and be careful not to fall as she rolled in pain. Monitoring of fetal well-being was undertaken using a pinard and the midwife simultaneously felt the woman's pulse and used a fob watch. She took the woman's blood pressure and then documented her findings on the partogram. The midwife had a calm approach, and wore a cap and apron as well as nail varnish and a wrist watch. The woman, like all women on the ward, was alone with no birth partner. The midwife provided some guidance on breathing technique.

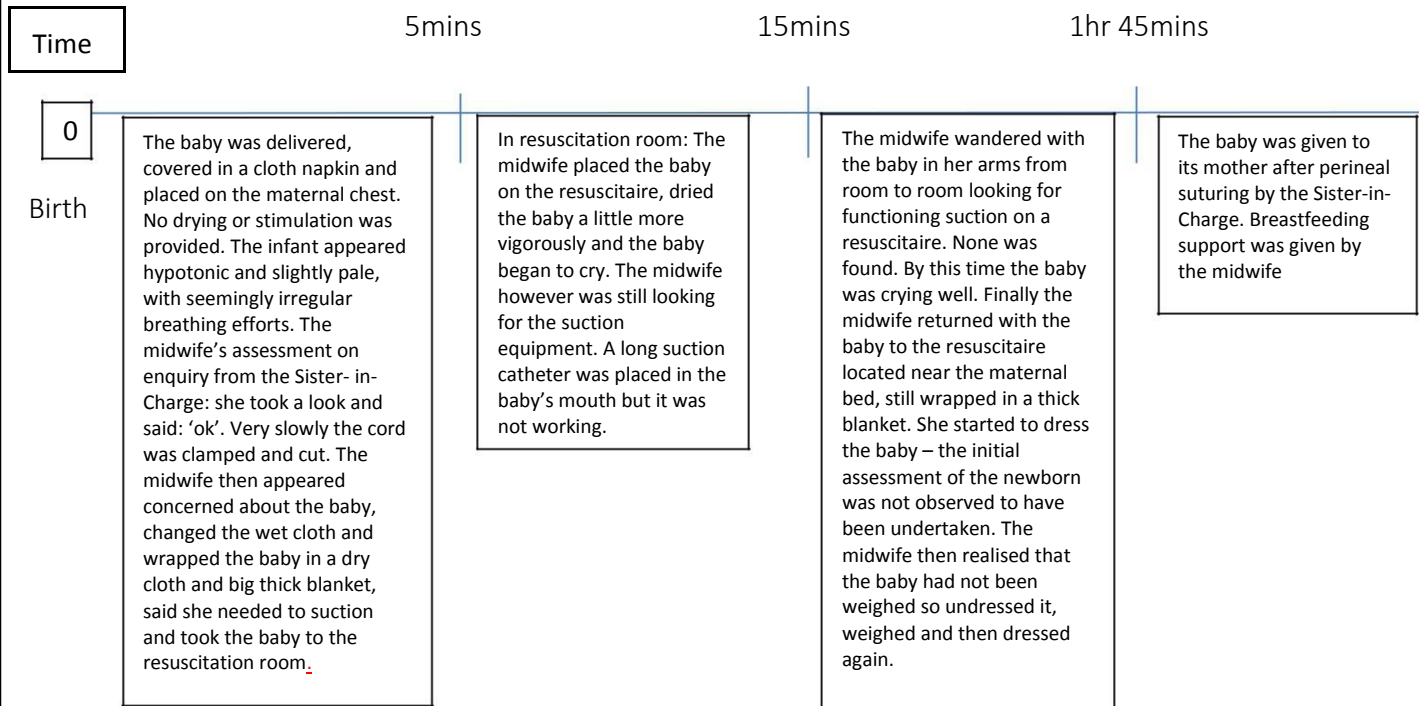
Neonatal care including:

4. Airway management, breathing and circulation; accurate assessment and calling for help. This section also considers relevant infection prevention measures.

A spontaneous vaginal delivery

A woman at term was exerting spontaneous pushing efforts in the right lateral position. Occasionally she was covered for dignity. Over about a 10 minute period no fetal monitoring was undertaken. The vertex was visible but it was uncertain whether this was noticed by the staff in attendance. The woman was asked to turn to the semi-recumbent position and at that point the vertex was noted to be visible. The midwife then quickly applied sterile gloves. In the semi-recumbent position maternal was encouraged by the midwife to push, but sometimes facilitating spontaneous efforts. The vertex was advancing steadily and the midwife prepared equipment for the delivery and applied surgical gloves. Two student midwives were noted to apply sterile gloves and then touch and lean on a non-sterile trolley. Three staff were in attendance at the birth with one midwife leading, using a hands on approach to facilitate the birth. There was no fetal heart rate monitoring in the 15 to 20 minutes preceding delivery. Figure 4 illustrates the observations made during the first two hours of the birth of a term baby at term.

Figure 4: Birth timeline



The lying-in ward

On the 'lying in ward': The babies were each fully dressed including wooly hat, warm jacket and wrapped in a thick blanket and lying in bed next to their mothers. One of the babies was born by caesarean section due to fetal distress and reportedly maternal cephalopelvic disproportion. The midwife took the babies' temperature. On observation one was 38°C and the other 38.5°C - no action was taken and the midwife moved on to attend to the next room. No further observation of the babies was undertaken.

A midwife was undertaking observations on both mothers and babies in one of the rooms, with two women and their babies on the first day following caesarean section. She worked between both women and no hand hygiene was observed between patient contacts.

Also see assessment issues in the Birth timeline (Figure 4).

5. Thermal protection at birth including the environment and skin-to-skin (STS) contact.

Babies wrapped in thick blankets and laid in cots in the resuscitation room.

There were four to five cots in a row next to the resuscitaire and three babies were placed in the cots (see diagram 2). The babies were fully dressed in baby clothes and wooly hat wrapped in thick warm blankets. The room temperature was certainly well above 25 °C. The Birth timeline (Figure 4) also shows how skin to skin contact was not facilitated at birth.

A Baby on the resuscitaire

A newborn baby was seen on the resuscitaire in the resuscitation room receiving facial oxygen wafted from a face mask by a member of staff. The baby was not dressed, and exposed under the heater in the supine position. It appeared to be an estimated between 2kg and 2.5kg. The Sister-in-charge asked the midwife to apply a cover over the baby to maintain warmth. Additional observations of thermal care are contained within the Birth timeline (Figure 4).

Observation/shadowing on the maternity unit (labour ward and postnatal): delivery of maternal and newborn care (4)

Neonatal care:

6. Early breastfeeding encouragement

This was observed on one episode following birth (See Birth timeline Figure 4) It occurred about three quarters of an hour after the birth as the woman underwent perineal suturing almost immediately after delivery. The midwife spent a few minutes discussing the importance of breastfeeding, supported the baby to latch onto the breast and offered advice on safe positioning. The baby was fully dressed and wrapped in a thick blanket whilst breast feeding.

7. Ongoing assessment of the newborn

A crying baby is brought to the resuscitaire by a midwife

The baby was weighed and found to be 2.03kg. The baby was then dressed including socks, hat and cloth nappy. The baby appeared alert with a minimal amount of mucous at the mouth and no sign of distress. The midwife decided to suction. A long suction catheter was attached to the suction tubing and inserted into the baby's mouth but the equipment was not working. Warmth and space to dress baby was the indication given by the midwife for bringing baby to the resuscitaire.

8. Discharge assessment of the newborn

Unfortunately this was not observed. The postnatal ward was visited in the afternoon when apparently all the newborn discharge examinations at the time had already been undertaken that morning.

9. Communication aspects – with mother/family; interprofessional groups; record keeping

On the maternity unit women labored and gave birth alone only supported by a midwife. Women's families were not permitted on the maternity unit. Several women, some elderly, were observed waiting either outside the labour ward or sat under the trees on a mound facing the main entrance to the maternity unit. On the neonatal unit mothers were observed handling their babies. Although it was reported that fathers could only look into the unit through the windows from the outside and only permitted when their child's health was in a critical condition, this was not observed at the time.

There appeared to be clear lines of hierarchical communication between staff with evidence of great respect for the staff in charge. Doctors had a separate hand over to midwives. No interprofessional communication was directly observed although staff mentioned that the staff in charge would communicate with the doctors if required.

Patient notes including partograms were used to document care. Written records of daily clinical activity (Figure 5) and still births was also noted. On the postnatal ward a copy of record of birth was issued to the mother for registration purposes.

10. Other general observations

It was noted that whilst female staff wore dresses with short sleeves and arms bare below the elbow, male student midwives wore white coats with long sleeves to the wrist.

4.2 Interviews

The interviews were particularly useful to complement information gathered from observation and helped provide clarification in areas. The first part of this section incorporates data from informal discussions with senior staff within the maternity and neonatal department, which provides an overview of the context in which care is provided. Amongst these were Nursing officers and Sisters-in-Charge. The questions proposed in Appendix 1 were used for guidance and are used in Table 2 to report findings. Table 3 on the other hand reports feedback from more formal interviews of clinical staff on the labour ward. A total of four staff were interviewed: one senior sister and three midwives. Due to time constraints, some of the questions that were addressed through observation were omitted during the interviews. The framework used in Appendix 2 has been adapted to summarise key findings from the interviews in Table 4.

Table 2. Neonatal service provision – context, staffing, systems and processes

Are staff trained in Newborn Life Support?	Some as part of EmOC (Emergency Obstetric Care Training); new people are awaiting training.
At what gestational age is resuscitation initiated?	More than 24 weeks – admit; This response was otherwise unclear.
Who attends the delivery of the very preterm infants?	Both obstetricians and paediatricians. This response was less clear and varied amongst a range of respondents.
If the infant needs transitional care where is this carried out?	Kangaroo mother care area. The same was visited – at the time of visit only one mother and her child were in the room; there were about 10 empty beds and a set of twins in one bed with one member of staff in attendance.
Who completes the initial examination of the newborn?	Midwives.
At what gestational age is the infant admitted to the neonatal unit?	From 24 weeks gestation.
Who cares for infants admitted to Neonatal unit – do they have Support Workers?	Nurses; there are no support workers.
What main respiratory support is given?	Nasal prongs, continuous positive airway pressure (CPAP); Ventilation.
Are cranial ultrasounds carried out?	Scanning equipment is available but no trained staff to operate.
Are decisions made to withdraw intensive medical management?	Response unclear.
What involvement do families have?	Only mothers are admitted into the neonatal unit; if the condition of the baby deteriorates then fathers are permitted.
Are infants transferred to the children’s wing at a certain age?	Response unclear.
What care is provided for in-utero and ex-utero transfers – is this different?	There were separated areas depending on source of admission.
How is ex-utero preterm or term sick infant transferred to UTH?	In the carrier’s arms - there are no transport incubators.

What types of observations are undertaken on admission to the neonatal unit?	<input type="checkbox"/> Suction depending on condition <input type="checkbox"/> Respiratory rate <input type="checkbox"/> Temperature <input type="checkbox"/> Heart rate – if less than 60 then the baby is intubated <input type="checkbox"/> Blood sugar <input type="checkbox"/> Two nurses cannulate <input type="checkbox"/> Follow up required investigations
Who completes the discharge examination?	Nurses. It was not ascertained how staff were equipped to undertake this examination.
What is the provision for follow up after discharge?	Patients' families are given a review date in the Out-Patient Department
Delivery rate of the maternity unit	Around 21,600 -25,500 per year Daily around 60 deliveries
Facilities/equipment	On the neonatal unit there were: <ul style="list-style-type: none"> <input type="checkbox"/> five CPAP machines <input type="checkbox"/> two working ventilators <input type="checkbox"/> two working cardiac monitors <input type="checkbox"/> no saturation monitor

An observation on the neonatal unit: There appeared to be strict adherence to infection prevention measures for visitors attending the neonatal unit.

The Lusaka school of Paediatrics and Child Health Nursing Stakeholders Meeting held during the scoping visit most powerfully and clearly demonstrated the shared concern and commitment to develop neonatal nursing and care in line with government priority. It also facilitated a platform for multidisciplinary and inter-agency collaboration on the subject. Attendance included representation from the following groups:

- Ministry of Health
- General Nursing Council
- Senior clinical staff including the Chief Nursing Officer, paediatricians, and nursing officers
- Educationalists including Principal Education Officer, Principal - Lusaka School of Pediatrics and Child Health Nursing and relevant clinical tutors.
- Brighton-Lusaka Health Link partners

There was agreement amongst all stakeholders for the development of a neonatal nursing course and unanimous expression of need for specially qualified neonatal nurses and enhancement of neonatal nursing skills overall. Further discussion, beyond this project and informed by it, would explore and clarify the methods to achieve this.

Table 3. Staff survey - knowledge and competency for maternal and newborn care (findings)

1. What is your professional qualification?	Senior midwife (n=1) Midwife (n=3)
2. How long have you been qualified/ worked within the unit?	Ranged between 3 years and 6years
3. What concerns in labour would cause you to refer to senior staff review?	Obstructed labour, 'baby stuck', shoulder dystocia, fetal heart rate concerns, uncertain findings on vaginal examination, cephalopelvic disproportion (CPD)
4. How would you communicate these concerns? (methods/means)	Shout/call for help to Sister- in- charge or crew leader
5. What action would you take in the following situations (maternal conditions likely to compromise the neonate): <input type="checkbox"/> non-reassuring fetal heart rate on auscultation <input type="checkbox"/> Maternal pyrexia in labour <input type="checkbox"/> Prolonged Rupture of Membranes <input type="checkbox"/> Preterm labour/delivery	Responses varied from: Check with a fetal Doppler monitor - if bradycardia then use CTG; if still concerns then inform the doctor and there may be need to transfer to theatre, also depending on cervical dilatation Expose - remove some maternal clothing; use a facecloth; administer fluids and paracetamol. When born the baby's temperature should be monitored and the baby will require antibiotics and possible neonatal unit transfer Transfer to the neonatal unit - that is the practice; consider antibiotics and avoid vaginal examinations. Administer Dexamethasone; resuscitate as baby is particularly at risk of asphyxia; the neonatal team is called if there are concerns but they are not usually on standby at the time of delivery; monitor fetal heart; ensure the use of a warm layette/maintain warmth; prepare for resuscitation. If more than 1.5/1.6kg the baby remains with its mother and instruction is given regarding care and nutrition, and feeding on demand; If the baby is less than 1.5/1.6kg then it is transferred to the neonatal unit. In case of birth in a home setting: use a brazier but ensure that the smoke subsides and have some water in a container nearby to humidify the air. The mother should be advised to top and tail, withhold bathing for at least a week and offer advice on cord care.
6. Have you been trained in the management of obstetric emergencies? Give some examples	Yes (all) As part of pre-service training and 2/4 had received Emergency Obstetric Care (EMOC) in- house training. A passionate elaborate reply was given by one midwife on the management of eclampsia along with a demonstration of relevant dosages and guidelines on the wall.
7. What are the signs of sepsis and symptoms of infection in the newborn?	Fever, irritable, crying, refusing to feed, mouth hot, high pitched cry, palms hot, high

	temperature; bulging fontanelle.
8. When the newborn presents with signs of infection what initial steps do you take?	Take baby to the neonatal unit for further management. Others said they did not encounter this because women and their babies are discharged to the lying-in ward within one to two hours of birth.
9. When a newborn baby weighs less than 2.5kg what special care do you provide?	Warmth; ensure sucking and rooting reflex is present; if problems then transfer to the neonatal unit. 4kg + are transferred to the neonatal unit. <1.5kg are transferred to the neonatal unit. 1.5-3.9kg remain with their mother
10. See Appendix 2 question 16.	All staff agreed on being trained in most areas but some variations existed as follows: Adult Basic Life Support - some were uncertain what this consisted of, but almost all indicated they had not undertaken this training post qualification. Newborn Life Support – some had received training offered by visiting doctors about two years ago; and otherwise all from pre-service training.
11. Please describe how you would diagnose asphyxia	No cry, poor colour/blue, poor reflexes and tone; Apgar of four at 10 minutes
12. Can you please discuss preparations and checks prior to neonatal resuscitation	Ambu bag – staff were uncertain of the required capacity; resuscitaire, oxygen/oxygen working, suction tube, penguin sucker, normal saline, cannulas, thermometer, intubating equipment, drugs
13. Scenario: A term baby at birth looks pale, not breathing, poor tone with a very slow heart rate. Please show me the approach to resuscitation that you would use. <i>In the absence of simulation equipment staff were asked to discuss. Only the 3 midwives responded to this question as the Sister was called away early to a meeting.</i>	Midwife 1: wipe, warm towel, resuscitaire on, head tilted, sucking secretions Midwife 2: cardiac massage, breathe x1, cardiac compressions x2 – then changed response to 3 compressions to 1 breath Midwife 3: dry, stimulate, apply sock to head and booties to feet, expose chest, suction tube, if respirations start by sucking, if not breathing extend neck, mask on, inflation breathe x20, suction, continue with Ambu bag, if no effort cardiac massage, 1 cardiac compression :4 breaths, continue until the baby is breathing adequately.

Survey questionnaire adapted from the 'Proposed obstetric and newborn signal functions' (Gabrysch et al 2012) in Gabrysch et al (2012 New Signal Functions to Measure the Ability of Health Facilities to Provide Routine and Emergency Newborn Care, PLOS Medicine, 9 (11) e1001340 and the 'Needs Assessment of Emergency Obstetric and Newborn Care' (AMDD (Averting Maternal Death and Disability) Program Needs Assessment Toolkit.(2010) available at: <http://amddprogram.org/d/content/needs-assessments> Accessed 18 June 2015

4.3 Document review:

A range of documents relating to neonatal care and care in the perinatal period were accessed.

- Intrapartum care guidelines

Guidelines for intrapartum care were usually posted on the wall. This mostly related to management of specific emergencies in labour and delivery such as eclampsia and breastfeeding policies. Some guidance was provided in the notes, for example in regards to the expected standard and frequency of observations to be undertaken in labour including Blood Pressure, pulse and temperature. Additional guidance on other aspects of care in labour was available from the following sources:

- Integrated management of pregnancy and childbirth. Managing complications in pregnancy and childbirth. A guide for midwives and Doctors (WHO 2007a) of which one copy was available. This also includes guidance for newborn resuscitation, immediate care as well as general infection prevention measures.
- Childbirth Postpartum and Newborn Care Guidelines. Agenda for essential practice in Zambia, Ministry of Health of which there was one copy.

These however were not readily accessible by staff and were stored in a drawer in the sister's office.

- Ward activity record – a snapshot was transcribed as follows:

Table 4.A snapshot of ward activity

<i>Admissions in 24hrs</i>	64
<i>Clinic referrals</i>	48
<i>Self-referrals</i>	6
<i>Booked</i>	8
<i>Born Before Arrival to the unit (BBA)</i>	2
<i>Spontaneous Vaginal Delivery (SVD)</i>	34
<i>Caesarean Section</i>	13
<i>Total deliveries</i>	52
<i>Hysterectomy</i>	1
<i>Fresh Still Birth</i>	1
<i>Macerated Still Birth</i>	2
<i>Midwives on duty</i>	7

- A record of stillbirths and other neonatal deaths was also kept on the ward. On review, the majority were referrals from the clinic/community and the following were recurring themes in regards to presenting history:
 - Prematurity
 - Congenital abnormalities
 - Maternal illness including hypertension, eclampsia, meningitis
 - Absence of fetal heart on auscultation

This echoed the findings provided in the overview presented by the doctors at the Stakeholder's meeting mentioned earlier.

- EMOC Course Handbook – in relation to neonatal resuscitation and care aspects: there appears to

be an emphasis on initially suctioning prior to administration of initial inflation breaths.

□ Resuscitation Guidelines

The following guidance was posted on the walls of the resuscitation room:

- 'Helping babies breathe' This is discussed below.

□ Curriculum

Elements of the Paediatric and Child Health Nursing curriculum and practice assessment document were shared at the Stakeholder's meeting. There were aspects of neonatal care present albeit lacking detail in regards to the specific content covered in areas, for example the examination of the newborn.

- A Concept Paper in support of a neonatal nursing course presented at the stakeholder's meeting by the Principal tutor for paediatric nursing clearly articulated the need for the development of a neonatal course against the background of global and local need.
- Presentations providing an overview of neonatal care at the UTH were facilitated by both medical and research staff. Of note:
 - They outlined current challenges in neonatal care in particular the high mortality rates due to prematurity, poor nutrition, infection and asphyxia
 - They stressed the need for specially qualified neonatal nurses to deliver focused high quality neonatal care on the neonatal unit working in collaboration with medical staff.

Limitations

General limitations of the methods of scoping used must be acknowledged, notwithstanding the small sample of case examples of care due to the limited scoping time. The 'Hawthorne Effect' related to the impact of the observer experience on the observed is also well recognised (McCambridge et al 2014). This means that some of the aspects observed may have possibly been done differently in the absence of observation. Equally, the staff interviews were limited to the very small sample and cannot therefore be generalised and should be seen as illustrative only.

Some specific constraints related to the timing of activity and opportunities available. For example, scoping on the postnatal ward took place in the afternoon and the postnatal discharge examination of the newborn had apparently already been undertaken that morning, therefore a missed opportunity. Time constraints also made it challenging to access a wider range of activity such as birth in theatre and instrumental delivery. Nonetheless it is hoped that the triangulation of findings from different sources provides a strong case for the creation of a neonatal course and/or enhancement of neonatal assessment and care skills for staff providing immediate and ongoing care for the neonate overall.

5. Issues arising – the case for enhancing neonatal care

Although there are some notable examples of good practice and knowledge base amongst staff, there are also key areas that need to be addressed. This section outlines the key issues arising from the findings and related implications for neonatal care. It serves to strengthen the case for the need to develop staff knowledge and skills in providing quality care in this important area.

5.1 Care around birth

Findings from observation, interviews and some documents all highlighted some concerns in regards to the care provided for the newborn around the time of birth as follows:

a) Fetal Monitoring

Whilst acknowledging possible resource constraints it was troubling to observe how the midwife in the observation scenario did not auscultate the fetal heart around the time of delivery and prior to the vertex becoming visible. It is vital to auscultate the fetal heart particularly at this crucial time in labour to validate normality and detect deviations which might indicate fetal compromise (Macdonald & Magill-Cuerden 2011). This would then prompt appropriate action to expedite delivery and hopefully improve newborn outcomes. That this was not undertaken in a high risk unit is probably even more worrying. Admittedly this is however one episode and cannot be generalised, but nonetheless useful to consider implications for the fetus and neonate.

Where the pinard stethoscope was used, this was undertaken judiciously in one observed case. However in my opinion the practicalities of using the pinard in varying maternal positions can be challenging. Particularly considering the tertiary nature of the unit it would be expected that more objective means such as Doppler sonicaid (Macdonald & Magill-Cuerden 2011) could be more readily available. This may be a resource issue but is important to consider in regards to enhancing early and objective detection of fetal complications in conjunction with other findings. CTG monitoring machines may also be helpful but do carry several controversial issues in regards to interpretation and application to practice. This would therefore require careful consideration of relevant training and practice implications. The impact of maternal position on fetal heart rate abnormalities is also well documented (Tamas et al 2007) but this concerns the wider context of midwifery practice which is beyond the scope of this paper.

b) Initial assessment and management of the newborn at birth

Some of the concerns highlighted in this area were to do with the seeming lack of urgency in initiating basic steps such as drying, discarding the wet towel, and facilitating skin to skin contact between mother and baby at birth. This is a fundamental approach to initial newborn care (Macdonald & Magill-Cuerden 2011; Resuscitation Council UK 2011). Moreover the importance of this action has recently been propagated in the 'Helping Babies Breathe' campaign which 'emphasises skilled attendants at birth, assessment of every baby, temperature support, stimulation to breathe, and assisted ventilation as needed, all within "The Golden Minute" after birth' (American Academy of Pediatrics 2011). Observing the length of time it took for the midwife to undertake simple stimulation and careful assessment of the newborn in the case example was deeply concerning in the light of the abundant literature on the importance and implications of thermoregulation in the newborn and the complications of cold stress (Blackburn 2013). Drying and stimulating the baby at birth would also allow the midwife to simultaneously assess wellbeing and need for resuscitation (Resuscitation Council UK 2011). This was delayed in

the case scenario and when asked, the midwife was uncertain and then went on to instigate suctioning - an action which did not seem necessary.

The literature discusses how suctioning can sometimes induce a vaso-vagal response causing a bradycardia and possible respiratory arrest (Blackburn 2013). Whilst it is an important principle of clinical practice to ascertain clear indications for intervention such as suctioning, this is even more important when resources are limited such as in the UTH setting. This was not indicated in any of the cases observed as the babies were alert, crying and responsive with good tone. The risk of cross infection can be very high with such a liberal approach to suctioning and in my view warrants review.

Minimally, it is important to establish that there was no indication to resuscitate in the case examples given from the scoping exercise, which leads one to question the rationale for action. The resuscitation guidelines based on 'helping babies breathe' however, do advise to clear the airway first as follows:

'If the baby is not crying, clear the airway and stimulate breathing.

- *Keep warm – position skin-to-skin and cover with cloth.*
- *Position the head – extend the head slightly.*
- *Clear the airway – remove secretions from mouth, then nose.*
- *Stimulate breathing – rub the back once or twice' (American Academy of Pediatrics (AAP) 2011).*

In slight contrast the current United Kingdom Resuscitation Council Guidelines emphasise the importance of opening the airway and administering inflation breaths. They advise careful consideration of the indications for suctioning:

'Airway suction immediately following birth should be reserved for babies who have obvious airway obstruction that cannot be rectified by appropriate positioning'

(Resuscitation Guidelines 2010 page 122).

With a variety of sources of information it is possible that confusion can arise for clinical staff and therefore the need to co-ordinate and streamline guidance to ensure most optimal patient care, particularly in multidisciplinary working environments.

Staff knowledge in regards to approach to resuscitation at birth was either inadequate or inaccurate in areas. It is interesting to notice how the issues mentioned above interlink and are interdependent. Without an adequate knowledge base, it is not surprising that staff would be unable to effectively assess and manage the newborn and birth, nor appropriately and confidently document events and outcomes and escalate in a timely manner.

5.2 Immediate postnatal care

Observation revealed two extremes in regards to thermoregulation: overheating and under heating. It was noticed that babies were usually wrapped in very thick blankets and placed in a cot or held by the mother or tucked alongside the mother in bed. From the example witnessed on the postnatal ward there was evidence of overheating, even though it did not require the temperature

to be taken to establish this. The influence of sleeping positions and environments on the risk of sudden infant death is well documented (Ponsonby et al 1992; Lequien & Carpentier 2000; lullabytrust.org). Furthermore there was the safety issue in regards to the possibility of the baby slipping out of the covering. This was actually highlighted by the midwife in the Birth time line when she alerted the mother to be careful in case the baby slipped out.

On the other hand it was also observed that sometimes the baby was exposed as in the case of the baby on the resuscitaire. The same would equally apply to the baby that was born and not immediately dried and stimulated. It was also interesting to note that skin to skin contact which would facilitate thermoregulation (Lumsden & Holmes 2010) was not encouraged at birth.

5.3 Transportation of the neonate

Concerns were expressed by both midwives and neonatal unit staff regarding the lack of transport incubators for transfers to and from the neonatal unit. More worrying was the reported absence of this when transfers were undertaken from the community to the hospital. Whilst both are critical the latter would certainly warrant urgent attention to prevent exacerbation of the infant's condition during transfer as a result of cold stress and related sequelae (Aylott 2006).

5.4 Infection prevention

From the presentations at the Stakeholder's meeting infection was highlighted amongst the contributing factors to the significant levels of neonatal morbidity in the neonatal unit. The efforts to address hospital acquired infection are a global priority with hand hygiene a key contributing factor (WHO 2007b). The practice of wearing long sleeved coats by male students and the lack of decontamination between patient care episodes pose a high risk for cross infection particularly in an area with very vulnerable individuals such as the newborn. It might also be worth reviewing the practice of liberal suctioning due to the high risk of cross infection especially when the equipment may sometimes not be fully changed between patients.

5.5 Admission/referral criteria for Neonatal Unit and multidisciplinary team communication

There did not appear to be clear evidence of criteria to guide practice in regards to summoning neonatal team attendance at the birth of an infant at risk. There were conflicting views about whether neonatal staff attended high risk births. Communication by a midwife to summon senior assistance mainly by shouting is a concern depending on various factors including location.

5.6 Family involvement – Labour ward and Neonatal unit

On the neonatal unit mothers were mainly engaged in care whilst fathers reportedly observed from the window. Whilst part of the rationale for this was to minimise infection risk, it would be important to review this practice in light of involvement and support of the family unit as a whole (WHO 2007a).

Equally it was observed that mothers typically labored and delivered alone with only the attendance of a midwife – no companions were allowed on labour ward. Some of the rationale provided for this was related to the challenges of ensuring privacy with vast numbers of women that often occupy and deliver along the corridor. The benefits of support in labour however are widely documented including positive impact on fetal wellbeing related to maternal hormonal influences (Walsh 2012). This practice would benefit from appropriate review with considerations for both environmental and staffing capacity implications.

5.7 Staffing and environmental capacity issues

Both staffing and environmental capacity to safely cater for the high turnover of women and babies was a huge challenge. The implications for neonatal health and provision of quality care should not be overlooked.

6. Conclusions and recommendations

Whilst acknowledging limitations the scoping exercise hopefully provides some useful information from a midwifery perspective in regards to the state of neonatal care provision within the UTH. Whereas it unraveled some areas of strength it was also clear that there was a strong need to improve staff knowledge and skills in this area particularly around the first few hours of birth. Of note however was the hard work, commitment and pride observed amongst staff who do their best often in challenging circumstances with overwhelming patient numbers and broken or absent essential equipment. Some staff also expressed passion and exceptional knowledge in the management of maternal- specific complications in labour. The attention to infection prevention measures on the neonatal unit is also worth noting.

On the other hand however staff did not seem to demonstrate the same passion and knowledge base when it came to neonatal care. It is also worth mentioning that most of the concerns arising from the scoping activity relate to basic and fundamental aspects of newborn care. Amongst the gaps in service provision are a lack of specially trained neonatal nursing and/or support staff, absence of a rolling system of staff training in Newborn Life Support, unclear interprofessional working practices around attendance for high risk deliveries, reported lack of trained staff to undertake neonatal cranial ultrasound scans, lack of appropriate transfer equipment to and from the neonatal unit and family involvement in care. The outcome of the scoping shows that there is a need for investing in neonatal care in line with the global and national agenda and clearly supported by local needs. Staff were also very eager to access opportunities to further develop their knowledge and skills in this area.

This paper would therefore submit the following suggestions for consideration in the development of the proposed neonatal nursing course and similar training for relevant staff to enhance neonatal care:

- Need to consider incorporating and/or strengthening staff knowledge and skills particularly addressing the gaps highlighted above within the proposed curriculum. Similarly appropriate training for cranial ultrasound scanning requires attention.
- Need to consider strong clinical leadership to address, mentor and sustain good practice in newborn care in the maternity unit and neonatal unit taken into account the areas highlighted
- Develop clear written criteria for admission to the neonatal unit to guide staff practice
- Need to review and ideally have clear written guidance about communication systems between obstetric and neonatal/paediatric colleagues in regards to attendance at the birth of infants at risk. Clarification of related issues such as when resuscitation should be initiated and how decisions are made to withdraw intensive medical treatment is also required.
- Need to source support for more effective and objective means of fetal monitoring in high risk labour suitable for the setting. Equally there is a need to consider vital equipment for the neonatal

unit such as saturation monitors, working ventilators and cardiac monitors.

- Need to review practices such as family involvement on the neonatal unit and labour ward.
- Need to review and source support for safe and effective means of infant transportation to and from the neonatal unit.
- Need to review dress code for male students and other relevant staff in regards to minimising the risk of infection.
- Need to address the practice of wrapping babies in very thick blankets immediately after delivery which may incorporate public health strategies.
- Need to improve staff knowledge and skills in the initial assessment and management of the baby at birth as a matter of urgency.
- Need to agree and implement a uniform hospital/country policy for the approach to resuscitation at birth
- Need to ensure that staff undertaking the discharge examination of the newborn are appropriately equipped with relevant knowledge and skills.
- Consider developing a health care support role in the neonatal unit that will assist and complement the work of the neonatal nurse.

The suggestions can be divided into short and long term goals to clarify priority areas and facilitate ongoing development.

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Appendix A

Staff Interviews - service provision/systems

Participant/s: Head of service/Matron/Lead for maternity unit or delivery suite or MDT with representation from teaching school, neonatal, midwifery, obstetric team

Rationale: link to education – understanding context of care/contextualising teaching

Method: 1-1 Interview /focus group; recorded

Demographics/Facilities, systems, processes and Context of care

1. Number of deliveries year?
 2. What is the rate of caesarean sections; operative vaginal deliveries; vaginal delivery?
 3. What routine and emergency obstetric care is provided in the unit?*
 4. What routine and emergency neonatal care is provided in the unit?*
 5. Are these services available 24/7?
 6. Is there reliable electricity and water supply to facilitate service delivery?
 7. Staff roles in obstetric and neonatal care
 8. a) What guidelines are in place for staff in regards to the care of women and babies?
- b) How do staff access these guidelines?
9. How are obstetric or neonatal referrals or emergencies communicated between units and professionals?
(*criteria, methods, processes, efficiency, distances*)
 10. What benchmarks if any, are used to measure the quality and standard of maternal and neonatal care in the unit?
 11. On a scale of 0-10 how would you rate the quality of care provided by this unit for maternal and newborn care?
 12. Please provide a reason for your response. (*What key problems/concerns are encountered in the provision of maternal and newborn care particular around childbirth?*)
 13. What do you think could help?

Staffing

14. What qualifications, skills or training requirements do staff need in order to work on delivery suite?
15. Are there skilled providers in sufficient numbers?
16. What Continuing Professional Development training is in place for staff providing routine and emergency maternal and neonatal care in the unit?
17. How is this organised? (*Mandatory? Frequency? Records? How do you ensure all staff are trained?*)
18. What are the main training needs working on the maternity unit? (general)
19. What are the main training needs of staff in regards to maternal and neonatal care around childbirth?
(general)

*Prompts:

For Question 3:

Routine obstetric (focus on peripartum)

- What are the methods of fetal monitoring used in the unit?

- (unless mentioned above) – How is labour monitored and managed? (e.g. use of partogram)
- What pain relief methods/choices are available for women in the unit?

Emergency obstetric

- What guidelines are in place for managing obstetric emergencies?
- Are they easily accessible for staff?
- Are all staff trained in the management of obstetric emergencies?
- Who is responsible for undertaking operative vaginal deliveries in this unit?

For Question 4:

- What measures are in place to ensure that babies are kept warm at birth?
- What is the practice and guideline related to cord care?
- What is the practice and policy regarding breastfeeding?
- What arrangements are in place for examination/assessment of the neonate prior to discharge?
- Immunisations and follow up care in the community?
- Standard for management of preterm or PROM – e.g. antibiotics
- Standard for management of preterm labour e.g. steroids
- Standard for thermal protection of preterm babies e.g. Kangaroo Care
- Alternative feeding options if baby unable to feed?
- Management of neonatal sepsis e.g. antibiotics
- Consider PMTCT (Prevention of Mother To Child Transmission) in HIV (not strictly emergency)

For Question 8

- Are there guidelines in place for neonatal resuscitation?
- What is the reference? (*source e.g. USA, UK, other*)
- How easily can staff access these?

For Question 15

- Describe the training requirements for staff in regards to resuscitation of the newborn at birth?
- What is the standard approach to newborn resuscitation in this unit? (expectations e.g. ABC; Resuscitation with BVM of non-breathing baby, which country's guidelines are used)

Survey questionnaire adapted from the 'Proposed obstetric and newborn signal functions' (Gabrysch et al 2012) in Gabrysch et al (2012) New Signal Functions to Measure the Ability of Health Facilities to Provide Routine and Emergency Newborn Care, *PLOS Medicine*, 9 (11) e1001340 and the 'Needs Assessment of Emergency Obstetric and Newborn Care' (AMDD (Averting Maternal Death and Disability) Program Needs Assessment Toolkit. (2010) available at: <http://amddprogram.org/d/content/needs-assessments> Accessed 18th June 2015.

Appendix B

Staff survey - knowledge and competency for maternal and newborn care

Professional identity		
1	What is your professional classification? <i>(Prompt : Please explain your role and responsibilities within the maternity unit)</i>	Obstetrician 1 Medical doctor (general physician) 2 Health officer (non-physician clinician) 3 Senior midwife 4 Midwife 5 Senior nurse..... 6 Nurse 7 Other (<i>specify</i>) _____ 8
2	How long have you been qualified/ worked within the unit?	
Maternal/fetal		
3	What are the main aspects of focused antenatal care?	
4	Which women require a special care plan? <i>(prompt: is there a distinction between high and low risk labour?)</i>	
5	How do you monitor maternal and fetal wellbeing in labour?	
6	For a woman in labor, what observations do you make as you monitor her progress?	
7	Where do you register these observations?	

8	<p>a) What concerns in labour would cause you to refer to senior staff review?</p> <p>b) How would you communicate these concerns? (methods/means)</p>	
9	<p>What action would you take in the following situations: (<i>maternal conditions likely to compromise the neonate</i>)</p> <ul style="list-style-type: none"> <input type="checkbox"/> Non reassuring Fetal heart rate on auscultation <input type="checkbox"/> Maternal pyrexia in labour <input type="checkbox"/> Prolonged Rupture Of Membranes <input type="checkbox"/> Preterm labour <input type="checkbox"/> Antepartum Haemorrhage 	
10	<p>Have you had training in the management of obstetric emergencies? (give examples)</p> <p>IF NO, PROCEED TO QUESTION 12 How</p>	
11	<p>would you manage the following?</p> <p>(use scenarios)</p> <p>Eclampsia scenario**</p> <p>APH**</p> <p>Cord Prolapse**</p> <p>Shoulder dystocia**</p> <p>Breech**</p> <p>Operative vaginal forceps/vacuum if qualified**</p> <p>Maternal Sepsis**</p>	
	Neonatal care	
12	The last time you delivered a baby, what immediate care did you give the newborn?	
13	What are the signs and symptoms of infection, or sepsis, in the newborn?	
14	<i>When the newborn presents signs of infection, what initial steps do you take?</i>	

15	<p><i>When a newborn weighs less than 2.5kgs, what special care do you provide?</i></p>	
	<i>Specific Training needs</i>	
16	<p>I am going to read a list of services. For each one I would like you to tell me if you've been trained (during pre-service or in-service training) to provide the service, and if you have provided the service in the last 3 months.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Use the partogram <input type="checkbox"/> Begin IV fluids <input type="checkbox"/> Administer IM or IV magnesium sulfate for the treatment of severe pre-eclampsia or eclampsia <input type="checkbox"/> Apply vacuum extractor <input type="checkbox"/> Apply forceps <input type="checkbox"/> Adult Basic Life Support <input type="checkbox"/> Resuscitate a newborn with bag and mask 	
	Neonatal resuscitation	
17	<p>Where did you receive training in newborn resuscitation?(e.g. in service, pre-service, other etc)</p> <p>IF NO TRAINING RECEIVED, GO TO 'COMMENTS' AND END SURVEY</p>	
18	<p>Please describe how you would diagnose birth asphyxia.</p>	
19	<p>Can you please discuss preparations and checks prior to neonatal resuscitation.</p>	

20	<p>Scenario: A term baby at birth looks pale, not breathing, poor tone with a very slow heart rate.</p> <p>Please show me the approach to resuscitation that you would use.</p> <p><i>(Prompt: range of airway opening manouvres)</i></p>	
	Invite Comments	

Survey questionnaire adapted from the 'Proposed obstetric and newborn signal functions' (Gabrysch et al 2012) in Gabrysch et al (2012 New Signal Functions to Measure the Ability of Health Facilities to Provide Routine and Emergency Newborn Care, *PLOS Medicine*, 9 (11) e1001340 and the 'Needs Assessment of Emergency Obstetric and Newborn Care' (AMDD (Averting Maternal Death and Disability) Program Needs Assessment Toolkit.(2010) available at: <http://amddprogram.org/d/content/needs-assessments> Accessed 18th June 2015.

Appendix C

Observation/shadowing on the maternity unit: delivery of maternal and newborn care

Neonatal care:
Routine care including:
1. Thermal protection at birth including surrounding and skin to skin
2. Infection prevention measures at birth including hygienic cord care
3. Early breastfeeding encouragement
4. Ongoing assessment of the newborn
5. Discharge assessment of the newborn
6. Communication aspect – with mother/family; interprofessionals; Recordkeeping
Emergency care including:
7. Accurate assessment and call for help
8. Thermal protection
9. Airway management, Breathing and Circulation
10. Communication and escalation
Routine obstetric care including:
11. Equipment and facilities
12. Infection control measures
13. Monitoring and management of care during labour and delivery

Survey questionnaire adapted from the 'Proposed obstetric and newborn signal functions' (Gabrysch et al 2012) in Gabrysch et al (2012 New Signal Functions to Measure the Ability of Health Facilities to Provide Routine and Emergency Newborn Care, *PLOS Medicine*, 9 (11) e1001340 and the 'Needs Assessment of Emergency Obstetric and Newborn Care' (AMDD (Averting Maternal Death and Disability) Program Needs Assessment Toolkit.(2010) available at: <http://amddprogram.org/d/content/needs-assessments> Accessed 18th June 2015.

Appendix D

Document analysis – related to the provision of maternity and newborn care

Ministry of Health guidance- including guidelines for care and staff training needs analysis

Unit guidelines

Women's notes –case examples of standard of care/identify

gaps Curriculum documents

Other relevant documents and research

