Obstetrical routines at the third stage of labour in a delivery unit in Jimma, Ethiopia – WANT study

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ABSTRACT

Background: Ethiopia has one of the highest maternal mortality rates in the world. The major cause of maternal deaths is postpartum haemorrhage. Active management of the third stage of labour reduces this risk. Late cord clamping and cutting may improve the neonatal outcomes.

We aimed to assess whether the clinical routines at Jimma University Specialized Hospital in Ethiopia follow international recommendations regarding management of the third stage of labour.

Methods: Our design was, in combination with a literature review, an observational study which was performed as a cross-sectional study during the period January 29th 2014 to February 12th 2014. Case report forms were used to collect data from a convenience sample and the results were analyzed in SPSS.

Results: We collected data from 87 women in labour and observed a total of 56 births. All women received oxytocin immediately after birth, controlled cord traction and uterine massage were performed. Early cord clamping was routinely practiced.

Conclusion: Controlled cord traction only gives a small reduction in blood loss postpartum, however, continuing this practice can still be beneficial for the mother. The limited access to operating theatres and the lack of access to blood transfusions make it even more essential.

Early cord clamping is not in accordance with the WHO recommendations. Delayed cord clamping increases iron stores, haematocrit and haemoglobin concentrations in both full term and preterm infants and is a cost free and easy way of improving newborn health.

PREFACE

We were introduced to the project by Professor and Dean of Education, Ingrid Os and Professor Thor Willy Ruud Hansen in August 2013. They had both visited Jimma University Specialized Hospital (JUSH), and were now searching for medical students to join the project that they were intending to start.

The project was initiated as part of a potential future student exchange program between Professor and Dean of education Ingrid Os at the Faculty of Medicine, University of Oslo (UiO) and Professor and Dean Abraham H. Amlak at the Faculty of Medicine, JUSH. During discussions with Dr. Netsanet Workneh, Head of the Department of Pediatrics and Child Health at JUSH, an interest was expressed in doing some baseline registrations and routine observations in the delivery unit. A potential cooperation with Dr. Workneh regarding an intervention related to newborn hypothermia at JUSH was the starting point for us to prepare a data collection form.

Our thanks to Dean of education Ingrid Os and to the Faculty of medicine, UiO who gave us the opportunity to travel to Jimma. Thanks also to Professor and Dean Abraham H. Amlak and Dr. Demisew Amenu at JUSH for the permission to attend the maternity ward. Thanks to Dr. Netsanet Workneh at JUSH for the warm welcome. We would also like to thank Dr. Jeanette Magnus for helping us during the starting process and Tolesa Tilahun Hafte, PhD for support and guidance on the journey, including his vast knowledge about Ethiopian history and culture.

A special thanks to our supervisors Katariina Laine and Thor Willy Ruud Hansen for all the help with the student thesis as well as good support in Jimma.

TABLE OF CONTENTS

ABBREVIATIONS

AMTSL- Active management of the third stage of labour

CCT - Controlled cord traction

CI - Confidence interval

CRF - Case report form

DCC - Delayed cord clamping

ECC - Early cord clamping

Hb - Haemoglobin

HDI - Human Development Index

HIV - Human Immunodeficiency Virus

GDP - Gross Domestic Product

IVH - Intraventricular haemorrhage

JUSH - Jimma University Specialized Hospital

LBW - Low birthweight

NICU - neonatal intensive care unit

PPH - Postpartum haemorrhage

RCT - Randomized controlled trial

RR - Relative risk

UiO - University of Oslo

UN - United Nations

WHO - World Health Organization

BACKGROUND

ETHIOPIA

Ethiopia is situated in East Africa (Figure 1) in the area commonly known as the Horn of Africa (1, 2). It has a surface area of about 1.2 million square kilometres and is the 7th largest country in Africa (2). It is bordered by the Sudan in the West, Somalia and Djibouti in the East, Eritrea in the North and Kenya in the South. Due to its proximity to the Middle East and Europe, Ethiopia has been a melting pot of diverse customs and cultures and has a long history of international trade.

Today Ethiopia embraces a complex diversity of nationalities with over 80 different languages (3). The most widely spoken languages are Amhara and Oromo, but English is in many ways the lingua franca of national communication.

Figure 1. Map of Ethiopia

History

Ethiopia's history goes more than 3000 years back in time (4). The Egyptians, Greeks and Romans all had strong trading links with Ethiopia which was one of the greatest merchant nations in the world. The Axumite Empire that existed between the 1st and 7th century AD is considered the most important empire and the origin of modern Ethiopia.

At the Berlin conference in 1884-85 the entire African continent was carved up between the European countries (5, p.11). The only two countries to escape this partition were Ethiopia and Liberia.

Until 1974 Ethiopia was ruled by emperors and kings, with a feudal system of government (4). Haile Selassie I was Ethiopia's last emperor and he ruled from 1930 to 1974. In 1935, Italy, lead by Benito Mussolini, marched into Ethiopia. Although the Ethiopians provided great resistance, the Italian army took control over Ethiopia and incorporated the country into one large territory, named Italian East Africa, together with Eritrea and Italian Somaliland. The Italians invested substantially in Ethiopian infrastructure development, particularly in the North.

When the Italians were defeated by British and Allied (including Ethiopian) forces in May 1941 Haile Selassie returned to the throne in Addis Ababa (4). He continued as emperor until he was, in September 1974, overthrown by the Military Co-ordinating Committee known as the Derg. The Derg was led by Vice-Chairman Mengistu Haile Maryam, whose years were marked by a massive militarization and totalitarian government. Mengistu´s army killed hundreds of thousands people, and in 2006 Mengistu was found guilty of genocide (6). The opposition to, and the disaffection with, Mengistu and the Derg encouraged the Ethiopian and Eritrean people to fight the regime together, and in May 1991 they managed to win control over Addis Ababa and Mengistu fled the country (4). After a long independence war following the fall of the Derg, Eritrea separated from Ethiopia.

Ethiopia was one of the last countries in Africa to have any semblance of democratic rule (4). After the fall of the Derg it took four years before Ethiopia finally had its first democratic election in 1995. The country's first years of democratic rule were, however, marked by growing conflicts with their neighbours in Eritrea. Even though the two countries had battled together against Mengistu, conflicts involving economy and borders lead to several violent clashes, and in 1998 war broke out between them. The war lasted for two years, and both Ethiopia and Eritrea suffered tens of thousands of casualties. With involvement from the United Nations (UN) a peace agreement was signed in December 2000. Sadly, the violent clashes between them did not end there. The conflict still simmers on today with both countries being accused of engaging in proxy-wars in Somalia and Djibouti (7).

Economy

Ethiopia is one of the world's poorest nations and its Gross Domestic Product (GDP) per inhabitant is 454 US Dollars (8). Due to, amongst others, focus on infrastructure and international export, there has been a rapid growth in the country's economy during the last 10 years. Unfortunately the country's Human Development Index (HDI) has not had the same steep growth curve, and the HDI is currently 0,435.

The Ethiopian economy is dominated by agriculture, which accounts for 43% of the GDP (9). Coffee has long been the main export item, and it accounts for two thirds of Ethiopia's total export values (10).

Population

Central Statistical Agency's latest number of Ethiopia's total population is 87 952 000 inhabitants (11), only 16 % live in urban areas (9). Ethiopia has more than 80 ethnic groups, varying in population size from more than 26 million people to fewer than 100 (12). Christianity and Islam are the main religions; about 60 % of the citizens are Christians and 33 % Muslims (13).

Life expectancy at birth is 58 years for men and 62 years for women (8). It is a country with a large population of children and young people, as 44 % is under the age of 15 years. 66, 1 % of the children complete primary school and only 14 % attend upper secondary school.

Maternal and child health in Ethiopia

Like the surrounding countries in North East Africa, the HIV prevalence in Ethiopia is relatively low; 1.5 % of the population between the ages of 15-49 years is HIV positive (9).

The mean fertility rate in Ethiopia is 4.8 children per woman, however, in urban areas the fertility rate is only half of the national figure (9). In recent years, the fertility rate has declined slightly. Ethiopian women have children at an early age and 50 % have their first child before turning 20.

There is inadequate coverage for antenatal care in Ethiopia, as only 19 % receive four or more antenatal care visits during pregnancy, and 57 % have none (9). Antenatal care is important in order to discover and prevent diseases during pregnancy, including iron deficiency anaemia which is very common with 52.3 % of the fertile women being anaemic (14). Anaemia is also a great challenge amongst children, as 44 % of children age 6-59 months suffer from anaemia (9).

Most Ethiopian women deliver at home; only 10 % of deliveries take place at a health facility (9). There are multiple reasons for the high rate of home deliveries. The most common causes appear to be that women feel it is not necessary or customary. Other reasons are lack of money or transport, both may be a significant impediment when there are long distances to health facilities, no transport is available or there is no money to pay for it. Consequently, most women deliver without skilled health providers, with assistance from traditional birth attendants and relatives (Table 1). However, this varies with the woman’s age, parity and especially if she delivers in urban or rural areas.

Table 1. Percentage assistance during delivery

	Doctor	Nurse/midwife	Traditional birth attendant	Relative/other	No one	Delivered by a skilled provider *
Background characteristic						
Age at birth						
<20	2.6	7.0	30.7	54.7	3.4	9.6
20-34	4.0	6.9	28.0	56.5	3.5	10.9
35-49	1.6	4.3	28.4	58.8	5.6	5.9
Parity						
1	8.6	12.1	27.4	47.6	2.5	20.8
2-3	3.7	7.9	27.4	56.9	3.0	11.7
4-5	1.8	4.3	28.1	61.1	3.3	6.1
6 +	1.0	2.8	30.6	58.9	5.9	3.9
Place of delivery						
Health facility	34.6	62.2	0.6	0.4	0.0	96.7
Elsewhere	0.0	0.4	31.5	62.9	4.2	0.4
Residence						
Urban	19.8	30.9	21.9	25.0	1.1	50.8
Rural	1.1	2.9	29.4	61.3	4.2	4.0

* Skilled provider includes doctor, nurse and midwife.

The first two days after delivery are critical, as most maternal and neonatal deaths occur during this period (9). Therefore, access to postnatal care is crucial. In Ethiopia, the level of postnatal care coverage is extremely low; 92 % of the women do not receive any postnatal check-ups. Postnatal care is not only important for monitoring complications, but also includes opportunities

to provide information and guidance regarding, amongst others, breastfeeding. It is crucial to start breastfeeding early, as there are few alternatives if problems occur. Breastfeeding is nearly universal and 82 % of the children in Ethiopia are breastfed for about 24 months.

Maternal deaths account for a large percentage of deaths among young women, corresponding to 30% in the age group 15-49 years (9). The maternal mortality rate was 990 deaths per 100 000 live births in 2000 (8). Although it has declined remarkably, as the number was 420 in 2013, this is still one of the highest maternal mortality rates in the world.

With the introduction of the United Nation Millennium Development Goal 4 there has been increased attention to newborn health worldwide (15). As a consequence of this, today the infant mortality rate in Ethiopia is 44 deaths per 1000 live births (8). Even though this is a substantial number it represents a vast decline, compared to 90 deaths per 1000 live births in 2000. There has also been a decrease in the under-five mortality rate in the same period, from 146 to 64 deaths per 1000 live births.

Jimma

Jimma is located in the Oromia region and has a total population of 120 000 people (16). The climate in the region varies a lot during the day (17). You find the coolest average night temperature at 7 degrees Celsius in December. During the summer heavy rainfall (approximately 130 mm per month) in Jimma leads to devastation of the roads.

JIMMA UNIVERSITY SPECIALIZED HOSPITAL

Jimma University Specialized Hospital is a public hospital located in Southwest Ethiopia, in Jimma city, 352 km from the capital Addis Ababa (18). It was establish in 1930 by Italians to provide a hospital for their soldiers. JUSH is the only referral hospital in the Southwestern part of Ethiopia and has an uptake area of 15 million residents. It provides health services for 15 000

inpatients, 160 000 outpatients and takes care of 11 000 emergency patients each year. The hospital offers all major medical services and has 300 beds. At the moment the government is building a new hospital with 600 beds, which is planned to be finished in September 2015.

The maternity ward at JUSH

There are 4 500 deliveries annually in the maternity ward which has 40 beds and is run by midwives, resident physicians and senior consultants in obstetrics and gynaecology (18). Medical students also attend the ward.

At the time of our visit the whole building where the ward was situated lacked running water, and power was provided by a generator.

The maternity ward at JUSH was organized in six rooms; a waiting room, a first stage of delivery room, a labour room, a post-operative room and two observation/infection rooms. In addition there was one surgery theatre and in emergency cases the staff used one of the surgery theatres in a nearby building.

When the women, after assessment of cervical opening, were classified as being in the first stage of labour, they were transferred to the second room with six beds. Here the medical staff (most often a medical student) measured the blood pressure, temperature, haemoglobin/haematocrit, did a urine analysis and blood typing, including rhesus type. On indication they did HIV testing. In this room they also performed vaginal examinations to assess cervical opening, palpated the frequency of contractions and listened to the foetal heart rate with Pinard stethoscopes. On some women they did an ultrasound examination, but lack of ultrasound gel often forced the staff to use water instead.

After examination and assessment confirming that the women were in the second stage of labour, they were transferred to a third room next door to the second. In this room there were four labour beds close to each other.

Most women carried a health card from a health center with her, containing information regarding antenatal care. The health card included information from routine antenatal care, such as history, parity, physical examination and laboratory tests.

Handling of the newborns

Immediately after birth the newborns were placed on a table, dried and wrapped, often in the same (wet) towel used for wiping the baby, unless the mother provided a piece of fabric. The medical staff did a quick assessment and weighed the newborns, which were then left alone for a long period before they were handed over to the mothers.

THE PROCESS OF LABOUR

The process of labour and birth is commonly divided into three stages (19, p. 213). The first stage is further divided into an early and a late phase. In the early phase the uterine cervix gradually effaces and dilates, the duration of this phase is defined as until the cervix is 3-4 cm dilated. In active labour the cervix begins to dilate more rapidly, the contractions of the uterus are stronger, last longer and appear more frequent. The second stage is defined as the time from when the cervix is fully dilated, which means about 10 cm, until the baby is born.

The third stage of labour is the period between the birth of the baby and complete expulsion of the placenta (19, p. 213-14). If the uterus is left without any artificial stimulation, it will take approximately 10-15 minutes before it contracts again. The contractions will lead to the expulsion of the placenta and the membranes, which is often referred as the afterbirth. After birth the birth attendant usually inspect the placenta and the membranes and attempt to estimate the blood loss (19, p. 207). Normal blood loss is under 500 ml. The afterbirth should be complete to make sure nothing is left behind in the uterus.

Different clinical approaches during the third stage of labour

The management of the third stage of labour can be divided into active and expectant (20). Active management refers to delayed cord clamping and cutting of the cord, uterine massage, controlled cord traction (CCT) and administration of an uterotonic drug to the mother. Oxytocin (IM/IV, 10 IU) is the recommended drug according to World Health Organization (WHO). When active management of third stage of labour (AMTSL) was first introduced, early cord clamping (ECC) and cutting was the prevailing practice (21). In recent years this has changed to delayed cord clamping (DCC). All interventions that are included in AMTSL aim to shorten the third stage of labour and therefore prevent postpartum haemorrhage.

Expectant management of third stage of labour is a less interventional approach (21). It includes late cord clamping, waiting for spontaneous separation of the placenta and its subsequent delivery. The prevalence of postpartum haemorrhage (PPH) differs between the countries in Europe, with and up to ten-fold difference in incidence between countries. The reason for this is thought to be the different approaches during the third stage of labour. The use of uterotonic drugs is extensive, but timing and clamping of the umbilical cord as well as controlled cord traction versus expectant placenta expulsion, show more differences between countries.

POSTPARTUM HAEMORRHAGE

The definition of postpartum haemorrhage is a blood loss of 500 ml or more within the first 24 hours after birth (21). If the blood loss is more than 1000 ml it is defined as severe. The prevalence of PPH is about 11 % worldwide and the prevalence of this obstetric complication is estimated to be even higher in low income countries where many women lack access to professional birth assistance. The mortality after birth is highest during the first 24 hours after delivery and access to skilled birth attendants and uterotonic drugs have a huge impact on the mortality.

The most common cause of PPH is uterine atony, which accounts for 80% of the cases (19, p. 258-259). Uterine atony means that the uterus does not contract appropriately, this leads to insufficient clamping of the vessels in the placental bed, so the bleeding continues. Other causes of PPH are injury to the birth canal, coagulopathy and retained tissues from the placenta.

The recommended treatment for PPH, according to WHO, is uterine massage, administration of oxytocin intravenously and fluid resuscitation consisting of isotonic crystalloids (20). If oxytocin does not stop the bleeding, or if the bleeding may be partially caused by a trauma, tranexamic acid may be used. In addition, WHO recommends the use of intrauterine balloon tamponade if the PPH is caused by uterine atony and the bleeding does not stop despite the use of uterotonics. If other management has failed uterine artery embolization and other surgical interventions are recommended, assuming the required resources are present. If the reason behind the PPH is uterine atony, bimanual uterine compression and external aortic compression are recommended as a temporary management until right management is offered. WHO advises against the use of uterine packing as a treatment for PPH due to uterine atony.

CONTROLLED CORD TRACTION OF THE PLACENTA

The history of the obstetric term goes back to 1933 when Brandt, and later Andrews, in 1940 introduced a procedure which later became known as the Brandt-Andrews manoeuvre (21). The procedure involved, once there were clinical signs of placental separation and contraction of the uterus, elevating the uterus suprapubically while maintaining a firm traction of the umbilical cord. The term controlled cord traction was introduced in 1962 by Spencer as an addition to the Brandt-Andrews manoeuvre. He described the procedure as applying a counter-traction (to the body of the uterus towards the umbilicus), to the traction of the umbilical cord. The procedure, still used today, is performed once the uterus contracts and the intention is to shorten the third stage of labour by facilitating the separation of the placenta from the uterus.

A serious complication of CCT is uterine inversion (21), a life-threatening condition where a part of the uterus indents towards (22). Uterine inversion is defined as complete if the uterine fundus passes through the cervix. This is a dangerous condition that can lead to serious blood loss and

development of circulatory shock. Because it is complicated to estimate blood loss during birth, underestimation often occurs. This probably explains why the development of shock often seems out of proportion to the amount of blood loss.

The risk of uterine inversion is higher if the controlled cord traction is performed incorrectly (21). Two examples are if the counter pressure to the body of the uterus is insufficient or if the procedure is performed before the uterus has contracted sufficiently. This shows the importance of knowledge prior to practice and limits the procedure to settings where the birth attendants master the technique.

Controlled cord traction

A systematic review and meta-analysis of five randomized controlled trials (RCT) from 2014, including 30 532 participants, discuss the value of CCT compared to hands-off management in the third stage of labour (23). The article published in the Acta Obstetricia et Gynecologica Scandinavica is the first comprehensive meta-analysis to determine the explicit effect of CCT in the prevention of postpartum haemorrhage. The authors found no difference between the CCT groups and the hands-off groups with regard to the incidence of severe PPH, need for blood transfusion or therapeutic uterotonics. On the other hand, CCT reduced the incidence of PPH generally with a relative risk (RR) of 0.93 (95 % confidence interval (CI) 0.87-0.99), numbers needed to treat 111 (95 % CI 61-666). The intervention also reduced the incidence of manual removal of the placenta in addition to reducing the duration of the third stage of labour.

The authors acknowledge some limitations of the meta-analysis (23). First, it was not possible to blind participants or health personnel in the trials. Second, the postpartum blood loss was measured in different ways in the five trials. More problematic, in some trials the blood loss was estimated by observation, this is an inaccurate method which often leads to underestimation of the blood loss. Another limitation is that only three of the trials were consider having a low risk of bias.

The Cochrane review entitled “Controlled cord traction for the third stage of labour”, published in The Cochrane Libary in 2015, illustrates virtually the same as above (21). Three RCTs were included, with data from 199, 4058 and 23,616 women respectively, comparing planned CCT versus no planned CCT. All women gave birth vaginally. They found no difference in the risk of severe PPH, risk ratio 0.91 (95% CI 0.77-1.08). In all three RCTs the authors found a reduction in PPH, RR 0.93, (95% CI 0.88-0.99). Two trials (27,255 women) demonstrated a reduction of mean blood loss, with a mean difference of -10.85 ml (95% CI -16.73 to - 4.98). In two of the trials CCT reduced the risk of manual removal of the placenta, RR 0.69 (95% CI 0.57-0.83). The biggest reduction occurred in the WHO trial where uterotonic was used routinely. The duration of the third stage of labour was shorter in the planned CCT groups. They found no statistically significant differences between the groups in the use of additional uterotonics, need for blood transfusion, maternal death/severe morbidity, operative procedures or in reported maternal pain. Regarding bias, the blood loss was measured objectively in all three studies.

The authors concluded that CCT has advantages and that the procedure routinely can be a part of the AMTSL, assuming that the birth attendants master the technique (21). The fact that the procedure does not reduce the risk of severe PPH makes it hard to argue for implementation in the active management package in places where the birth attendants are not trained in the procedure.

It is interesting that, although in the review there was a reduction in blood loss over 500 ml looking at all trials together, in one of the RCTs (4058 participants) there was no statistically significant difference in the incidence of PPH (24). The incidence of PPH in the controlled traction group was 9.8% compared to 10.3% in the standard placental expulsion arm, RR 0.95 (95% CI 0.79 to 1.15). However there was a reduction in the incidence of manual removal of placenta and the duration of the third stage of labour in the CCT arm. The incidence of duration over 15 minutes was 4.5% and 14.3% respectively, RR 0.31. There were no reported cases of uterine inversion in any of the 4058 participants. An unexpected outcome was that the women reported significantly less pain and discomfort in the CCT arm.

A complication in 1 of 22 women in the controlled cord traction group was cord rupture (24). Although, this is an undesired complication, the risk of manual removal of the placenta was not

higher in this group. In 52% of the cord rupture cases, delivery of the placenta occurred without any intervention. The authors conclude that CCT can be omitted in favour of implementation of DCC in high resource settings, as CCT had no significant effect on PPH.

ANAEMIA

Anaemia is a condition in which the concentration of haemoglobin (Hb) in the blood is decreased (25). Haemoglobin is the oxygen carrier in the red blood cells and lack of this crucial component can lead to insufficient oxygen supply to the body's tissues. Anaemia is one of the biggest medical challenges in the world with a global prevalence of 24.8%, preschool-age children being particularly vulnerable (26). Several different conditions can cause anaemia; nutritional deficiencies, infections, chronic blood loss, acute and chronic inflammation as well as different disorders that can affect the production of the red blood cells or the synthesis of haemoglobin (27, pp.381-385). The most common cause, however, is iron deficiency anaemia.

The haemoglobin concentration changes during life, being highest in newborns, between 15 - 23 g/dL (27, pp. 381-383). During the first weeks of life it gradually falls and reaches its minimum at 2 - 3 months with a concentration of 9.5 - 13 g/dL, before it increases up to adult values which are 12 - 15 g/dL in females and 13.5 - 15 g/dL in males. During pregnancy Hb concentration falls and values under 11 g/dL are considered as anaemia (19, p. 195). In preterm neonates the Hb concentration is lower than in full-terms, and it can be as low as 6 -8 g/dL, this is called "anaemia of prematurity" (27, pp. 381-383).

Haematocrit is defined as the volume percentage of red blood cells in the blood (25). Normal values for newborns are 0.32 - 0.40, for females 0.35 - 0.46 and for males 0.40 - 0.50 (28). During pregnancy normal values are 0.28-0.40 (29).

THE UMBILICAL CORD

The umbilical cord is a part of the placenta and it functions as a connection between the placenta and the foetus (30, p. 429-432). It consists of two arteries and one vein surrounded by a gelatinous substance called Wharton's jelly. The umbilical vein provides the foetus with oxygenated and nutrient rich blood from the mother. The two arteries transport deoxygenated blood and waste material from the foetus back to the mother. After birth, the temperature fall and the fall in prostaglandins cause vasoconstriction of the smooth muscles cells in the umbilical blood vessels and after a few minutes the circulation ceases. At the same time, when the infant takes its firsts breaths, the pulmonary vascular resistance falls which leads to an increased pulmonary flow.

PLACENTAL TRANSFUSION

After birth the blood flow from the placenta to the infant continues for a few minutes, this is called 'placental transfusion' (31). The placental transfusion lasts for about two minutes, but might continue up to five minutes. If the umbilical cord is cut immediately after birth this transfusion is abolished. Several factors influence the amount and the duration of the placental transfusion; how hard the placenta is squeezed by the uterus, the infant's position relative to the placenta when the umbilical cord is cut and when it is cut.

In term infants approximately 80 mL of blood is transferred from the placenta to the infant at one minute after birth and approximately 100 mL within three minutes after birth (32). In preterm birth the placental transfusion might take longer because a greater proportion of the feto-placental circulation is in the placenta and the umbilical vein is smaller (33). Due to this fact, when practicing delayed cord clamping, the relative contribution in blood volume might be greater than for term infants.

EARLY AND DELAYED CORD CLAMPING

At birth the separation of the neonate from the placenta is performed by placing one clamp close to the infant's navel and another clamp further along the umbilical cord, and then the cord is cut between the two clamps (34). Traditionally, birth attendants used a cloth tie to clamp the umbilical cord. In 1899 the first commercial cord clamp was made by Magennis, with a statement that this would reduce the risk of infection in comparison to the cloth tie. Along with the cord clamp followed the instructions to clamp the cord only when it had "ceased to pulsate". The timing of clamping and cutting the umbilical cord has been a subject for debate for decades, and the interesting question is; what is the optimal timing?

Already in 350 BC it was stated by Aristotle that cutting the cord too early after birth might harm the baby (35). This statement was later supported by Erasmus Darwin and Charles White in 18th and 19th century. In 1801, Erasmus Darwin wrote;

> *Another thing very injurious to the child, is the tying and cutting of the navel string too soon; which should always be left till the child has not only repeatedly breathed but till all pulsation in the cord ceases. As otherwise the child is much weaker than it ought to be, a proportion of the blood being in the placenta, which ought to have been in the child.*

In the literature there are different definitions of what constitutes early and late cord clamping. Early cord clamping is defined as clamping and cutting the umbilical cord within the first 60 seconds after birth (usually between 10 to 30 seconds), whereas late/delayed cord clamping is defined as clamping and cutting the cord after at least one minute after birth, or when the pulsation in the umbilical cord has deceased (32).

Cord milking is suggested as an alternative to increase the blood flow from the placenta to the infant without having to practice DCC. It is a technique where the mid wife, immediately after birth, puts her fingers on the umbilical cord close to the mother, pinches the cord and runs her

fingers towards the infant (33). Cord milking is not as thoroughly studied as DCC and we will not discuss this further in our paper.

Cord clamping in term infants

In 2013 the Cochrane library published a large review on timing of umbilical cord clamping, which included 15 trials involving a total of 3911 births (36). They looked at several different outcomes for early and delayed cord clamping involving both the mother's and the neonate's. Regarding the maternal outcomes, they found that there were no significant differences in PPH, severe PPH, or in mean blood loss. No differences were found in maternal haemoglobin, at 24 to 72 hours after birth, in the need for blood transfusion to the mother or need for manual removal of the placenta. For the neonates there were no significant differences in Apgar score, admission to the neonatal intensive care unit (NICU), respiratory distress, breastfeeding at discharge or polycythaemia.

Significantly fewer newborns in the ECC group required phototherapy due to jaundice (36). 2.74% in the ECC group compare to 4.36% in the DCC group, RR 0.59 (95% CI 0.38-0.92). In terms of the haematological status, the infants in the ECC arm showed significantly lower haemoglobin concentration (mean difference -1.49 g/dL, 95% CI -1.78 to -1.22) and haematocrit at 24 hours than the infants in the DCC arm. This difference did not persist at three and six months. Five of the trials reported that the infants in the ECC group were more likely to have iron deficiency than those in the DCC group. Nevertheless, there was high heterogeneity for this outcome as the different trials used different ways to measure, as well as define, iron deficiency.

An RCT on delayed versus early cord clamping, performed by Andersson et al. in a Swedish country hospital, included 400 full term infants born after low risk pregnancies (37). The authors aimed to measure the possible differences in infant haemoglobin and iron status at four months. Andersson and his colleagues discovered that infants randomized to DCC had a higher mean serum ferritin concentration and a lower prevalence of iron deficiency anaemia at four weeks of age than the infants in the ECC group. However, only two infants – both belonging to the ECC

group, fulfilled the criteria for iron deficiency anaemia. As iron deficiency anaemia rarely develops before 4-6 months in full-term, normal weight babies, this was an expected outcome.

Two years later the same authors published a new study on the timing of cord clamping, this time with a follow-up at 12 months of age that included evaluation of iron status and parental assessment of neurodevelopment by the Ages and Stages Questionnaire (38). They concluded that DCC did not affect iron status or neurodevelopment. In retrospect they questioned whether it might be the limited population size (347 infants) and the methods used that accounted for the lack of findings.

Cord clamping in preterm infants

A meta-analysis published in Obstetrics and Gynecology that included 12 studies aimed to investigate different transfusion strategies in very preterm neonates (39). Their conclusion was that DCC or cord milking had better outcomes for the neonates than ECC. In the DCC arm there was a lower incidence of intraventricular haemorrhage (IVH), less need for blood transfusion and an overall lower mortality rate in comparison with the ECC arm. Ten of the studies observed a higher initial haematocrit in the DCC group and six studies less need for blood transfusion. Four studies also registered a higher blood pressure in the neonates in the DCC group. None of the studies reported differences in mean peak serum bilirubin levels.

In 2012 The Cochrane Library published a review on timing of umbilical cord clamping at preterm birth (40). The review included fifteen studies with 738 infants born between week 24 and 36. They concluded that there were no differences in Apgar score or temperature on admission to NICU. The infants in the ECC group had a significantly lower blood pressure both at birth and four hours after, they were more likely to need transfusion due to low pressure and there was more need for inotropic support. Ten of the trials reported on IVH and found that early cord clamping was associated with a higher risk, 0.85% compared to 0.59% in the DCC group, for all grades of IVH. The risk of developing necrotizing enterocolitis was lower in the DCC arm with a risk ratio of 0.62. 36% of the neonates allocated to ECC required blood transfusions due to anaemia, significantly more than in the DCC group where 24% needed blood transfusions.

Regarding hyperbilirubinaemia, there was an overall higher peak bilirubin in the DCC arm than in the ECC arm, however, no significant difference in the need for phototherapy was found. Two trials reported that more placental transfusion reduced the risk of developing sepsis.

Even though many of the outcomes had quite large confidence intervals, the authors concluded that prolonged placental transfusion is beneficial and might lead to a better control of blood pressure and improved circulatory adaptation for preterm infants (40).

A South Indian study with one hundred preterm infants found that DCC significantly increased the haematocrit in infants on day 1; RR 7.2, 95% CI 5-9.56, and at 6 weeks; RR 4.84, 95% CI 3.2-6.4 (41). The serum ferritin was higher in the DCC group at 6 weeks when compared to the ECC group. At the 6-week follow-up they also found that the rate of exclusive breast feeding was significantly higher in DCC arm (100%) compared to the ECC arm (89.5%). The authors assumed that this was due to the early skin to skin contact that was established with late cord clamping. On the negative side the DCC group required a longer duration of phototherapy, but there was no significant difference in the incidence of jaundice.

STUDY QUESTIONS / AIM OF THE STUDY

We chose to focus on the third stage of labour because this is a critical period during birth and the handling of the different components in this phase can have significant impact on outcomes for both the mother and her newborn. Globally the incidence of post-partum haemorrhage and maternal mortality has declined, partly because of the implementation of active management of the third stage of labour. This had lead to a discussion about the effectiveness of the different components of the management of the third stage of labour. Neonatal outcomes are also affected by practices during this period, especially the timing of cord clamping.

Overall aim of the study was to assess if the clinical routines at JUSH follow the international agreement and WHO recommendations regarding the management of the third stage of labour. Specific study questions:

- Is the active management of third stage of labour practiced in JUSH?
- Is Oxytocin administrated routinely after birth to reduce postpartum haemorrhage?
- What is the current routine of cord clamping timing in JUSH? Is late or early cord clamping practiced?

MATERIAL AND METHODS

STUDY DESIGN

Our design is an observational study at the maternity ward at JUSH, Jimma, Ethiopia. This is a cross-sectional study combined with a literature review. Our further plan was to follow up our observations and develop our study into a cohort. Another plan was to create an intervention project conceived as collaboration between medical students in Jimma and medical students from the University of Oslo. As a starting point of our study we wanted to get some baseline data to get an understanding of the routines at the maternity ward and the reasons behind them.

In this report we compare the observed clinical routines and practice in the maternity ward in JUSH with WHO guidelines regarding obstetrical routines at the third stage of labour. For the literature review we did a McMaster PLUS search with the keywords; "Active management of the third stage of labour", "placenta controlled cord traction", "delayed vs. early cord clamping" and "timing of cord clamping". We chose to include meta-analyses and studies from the Cochrane Library and PubMED.

The comparison aims to emphasize the potential for improvement for women and newborns in the maternity ward at JUSH.

STUDY POPULATION

The study population that we base our material on consists of a convenience sample controlled by when we attended the maternity ward. We had no exclusion criteria; our intention was to cover as many births as possible. Unfortunately we were not able to observe all births, due to the high frequency of concurrent deliveries.

SAMPLING TECHNIQUE

In November 2013 the student group consisting of the medical students Fanny Andersson, Kine Lunde Frydenberg, Fredrik Hjortaas, Kaja Langeland and Linn Oftenes Lie started to create a draft for a data collection form. With assistance from our supervisors Katariina Laine and Thor Willy Ruud Hansen the observation form was completed in January 2014.

The data collection forms consisted of four modules;

Module 1: Mother attended - revolves around observations of clinical routines at mother´s arrival, her obstetrical history and maternal demographics.
Module 2: Delivery - routines and procedures during the second and third stages of labour.
Module 3: Newborn - handling and examination of the newborn.
Module 4: Newborn emergency - resuscitation of newborns with asphyxia.

See attachment on page 41.

RECORDING PROCEDURES

We attended the maternity ward from January 30th to February 11th 2014, from 8.30am -8.00pm. We were always two or three students attending the ward at the same time. The days were divided into two shifts, one from 8am-2pm and the other from 2pm-8pm. We used case report form (CRF) numbers on each data collection form in order to maintain the confidentiality of the patients. We had determined which CRF number each student should start on in advance to avoid misunderstanding and overlap. Before we started the registration we listed the CRF numbers on top of all the modules so that we were able to split the registration form in two. This was particularly helpful when we wanted to do observations of the mother and her newborn simultaneously.

DATA ANALYSIS

Our first step in the analyzing process was to plot our findings into Excel. Katariina Laine then transferred the results into SPSS.

ETHICAL APPROVAL

Before we travelled to Jimma permission to do the study was sought from Dean Abraham and Dr. Demisew, who both welcomed us to do the observation at the maternity ward. On our first day at JUSH we participated in a morning meeting where we were introduced to some of the staff. Even so we are uncertain about the amount and kind of information that was given to the midwives and doctors about the reason for our stay and our attendance at the maternity ward.

RESULTS

During our observation period at JUSH we collected data from 87 women in labour and observed a total of 56 births of which 29% Caesarean sections (Figure 2). Three of the births were twin births which gave a total of 59 newborns, seven of whom were stillborn, and an additional three died within one hour (Figure 3). Due to, amongst others, transfers to NICU, we were not able to observe all 52 liveborns the first hour after birth, so it is possible that this number is even higher. Of the 47 women we were able to follow, none died within the first hour after giving birth.

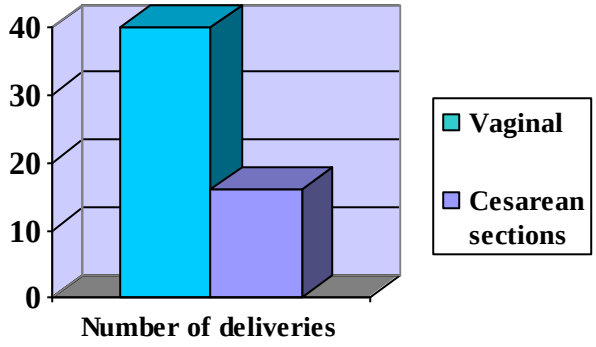


Figure 2.

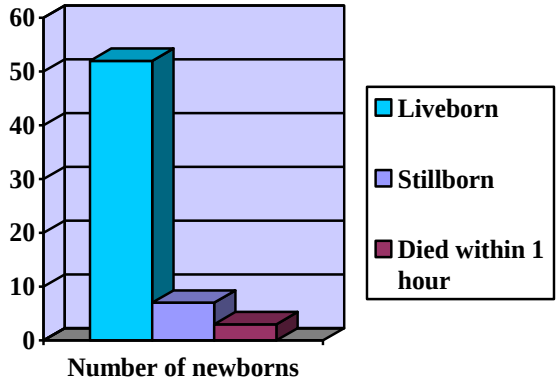


Figure 3.

The pregnancy duration was estimated by asking the women to estimate the duration of amenorrhea. Only three women had been to a prenatal ultrasound, and 15 women knew the exact date of their last menstrual period. In five of these women the pregnancy duration was shorter than 37 weeks. The remaining women were uncertain or claimed to be amenorrhoeic for about nine months.

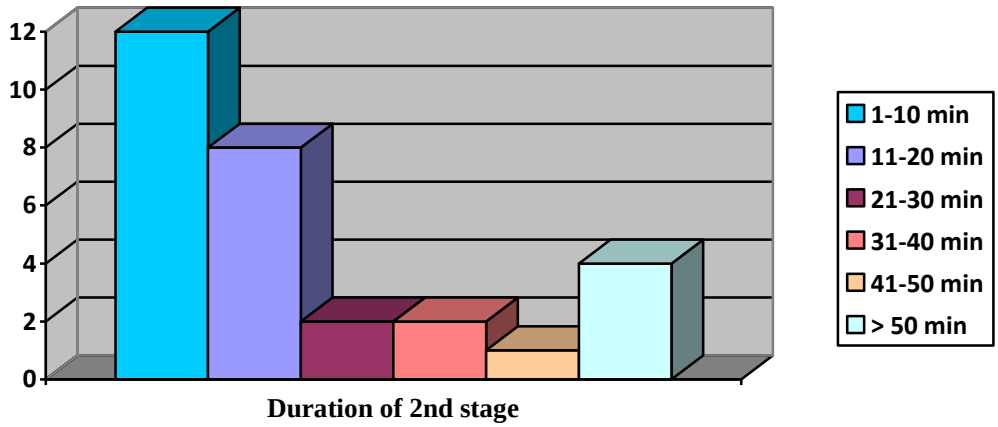
FIRST AND SECOND STAGES OF LABOUR

Of the 87 women in labour, blood pressure was measured in 76. 66 values were recorded, 12 of them were considered pathological. Three of the women were hypotensive and nine had values compatible with hypertension. From seven of the hypertensive women a urine sample was collected, but only five of them were analyzed, of which two were positive for proteinuria (+1).

Axillary temperature was measured in 58 of the women and recorded in 51 cases, none of them fulfilled the criteria for fever. Haemoglobin was measured in 17 women and recorded in seven, two of them were anaemic (values; 10.7 g/dL and 9.6 g/dL). Haematocrit was measured in 25 women, two of them were anaemic, with values of 23 and 26 respectively.

The birth attendants did not use a partogram but wrote down the time for assessment of cervical opening, frequency of contractions and foetal heart rate. The foetal heart rate was measured by use of Pinard stethoscopes and the recorded values were all normal except one with a value of 60 beats/minute. During labour there were midwifes, medical students, nurses and obstetricians present. None of the women were allowed to bring their spouse or other relatives. The number of persons present at deliveries varied between one and 20 persons, with a mean number of 7, 34. The duration of the second stage of labour showed some variation, but in most cases it was remarkably short; in 79% shorter than 27 minutes and in 40% shorter than 11 minutes, respectively. Figure 4 illustrates the number of cases with corresponding durations of the second stage.

Figure 4



Pain relief during vaginal labour was almost non-existent, there was no epidural/spinal anaesthesia, pudendal blockade or nitrous oxide, only two women received pethidine.

THIRD STAGE OF LABOUR

In the maternity ward at JUSH they practiced active management of the third stage of labour during our observation period, except for the practice relating to clamping of the umbilical cord. All women received oxytocin intramuscularly right after birth, the birth attendants practiced CCT, and uterine massage was performed on all women. We have data from 44 births regarding clamping of the cord, none of them can be considered as delayed cord clamping (Figure 5). 95% were clamped earlier than 19 seconds after birth, two umbilical cords were clamped at 29 and 35 seconds respectively. 60 % were clamped immediately after birth (before 10 seconds).

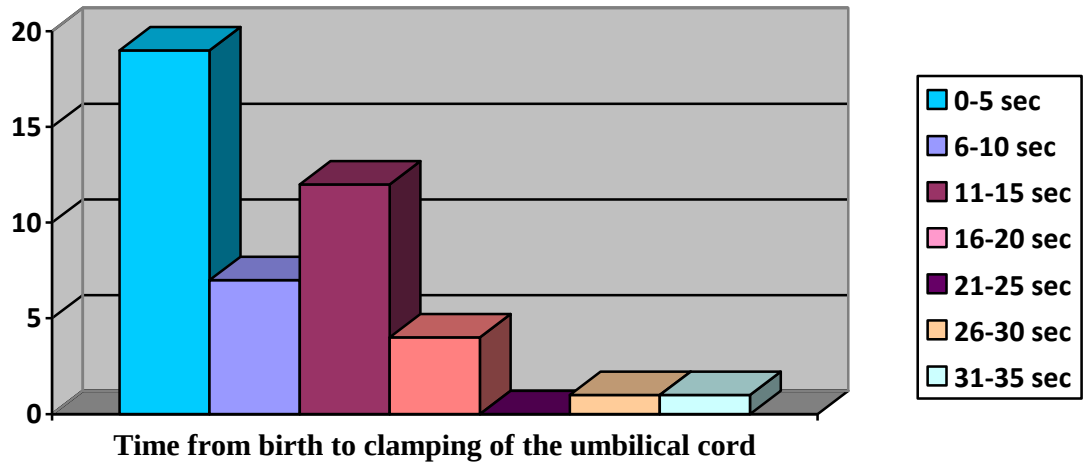


Figure 5.

We also observed the position of the newborns at the time of clamping and cutting of the umbilical cord. In a total of 51 births, 43% of the newborns were positioned below placenta level, in the remaining 57%, 31 % were placed on the mothers' chest.

In cases where the delivery of the placenta was delayed, we observed the following procedures; external massage of the uterus and manual removal of the placenta. In one case external massage

alone was sufficient to facilitate the expulsion. In total, we observed seven manual removals and with one exception they were all carried out in the labour room without anaesthesia or any other form of pain relief. One removal was performed in the operating theatre.

The health staff did not measure the blood loss objectively, they lacked proper equipment for blood loss measurement and there was no access to fabric pieces to use as an alternative method. Only on two occasions we were informed that the blood loss was estimated to 500 and 1500 ml respectively and as far as we know, a protocol to record estimation of blood loss was absent at the maternity ward. Consequently, we lack data on post partum blood loss and incidence of PPH from the observation period.

In cases of excessive bleeding, external massage of the uterus, fluid resuscitation, oxytocin intravenously and administration of misoprostol were performed. We have recorded altogether 22 cases where interventions due to excessive bleeding took place. External massage occurred in 73% of the cases, fluid resuscitaton was administered in 41% of the cases, oxytocin in 32% and misoprostol in 4, 5%.

Regarding afterbirth assessments, the birth attendants did not weigh the placenta or measure the cord length. Although we did not ask if a visual inspection was performed, in 15 of the births (27%) it appeared that the birth attendant inspected the placenta and its membranes, in the remaining cases we observed no attempts to inspection. There were no report forms for routine assessments of the afterbirth available.

THE NEWBORNS

The average birth weight of the 54 neonates who were weighed was 3069g, four stillborn infants were never weighed. 15 % of the neonates had a birth weight under 2500g and the three smallest weighed 900g, 1000g and 1000g respectively.

After weighing the newborns the birth attendants placed them on a table where they were left alone for an average of 38 min. We have the accurate number of minutes of the period when the

newborns where unattended in 27 cases. In three cases, not included in the average, we ended the observation after one hour, the newborns had then still not been handed over to the mother. In total we observed six cases where the newborns where left alone for at least one hour. We only observed three cases where temperature measurements were performed on the newborns.

DISCUSSION

WHO has recommendations for the prevention and treatment of postpartum haemorrhage. Active management of the third stage of labour is recommended, as the procedures are estimated to reduce the risk of severe postpartum haemorrhage by about 60-70 % (21). The decision of when to use the different components of AMTSL, is based on the background and experience of the person who performs them (20). WHO distinguishes between skilled birth attendants and non-skilled birth attendants. Concerning CCT, the recommendation is conditional upon being performed by a skilled birth attendant, while it is not recommended that a non-skilled birth attendant performs the procedure. By 'conditional' the WHO means that the implementation can be based on values and preferences of the women and the birth attendants. This recommendation is based on the fact that CCT has shown only a small reduction in blood loss and the duration of the third stage of labour. As presented under results, controlled cord traction was practiced at JUSH during our observation period. This is in accordance with the guidelines, as the birth attendants at the maternity ward are considered to be skilled. Regarding values and preferences for the procedures, the women appeared not to be granted autonomy, as all decisions appeared to be made by the health care professionals.

Even though CCT only results in a small reduction in blood loss postpartum (20) and in the -incidence of PPH (21), continuing this practice can be crucial. Worldwide, pregnancy and child birth complications contribute to more than half a million maternal deaths per year (14). According to the WHO, 95 % of these occur in sub-Saharan Africa and Asia. Postpartum haemorrhage is the major cause, and in Africa it accounts for approximately one third of the maternal deaths. In Ethiopia, however, this figure is much lower, as deaths due to PPH account for only 10% of maternal deaths. WHO questions whether this could be explained by under-diagnosing and under-reporting, as unpublished figures show a higher prevalence, up to 30 %. Most of these cases occur outside health care facilities, however it is of great importance to concentrate on all available approaches to reduce PPH in hospitals as well. At JUSH there is limited access to operating theatres, and the maternity ward does not have any facilities to provide blood transfusions, therefore prevention of potential haemorrhage is even more essential.

After a PPH, anaemia is a severe complication. In Ethiopia this is even more evident, as 62.7% of pregnant women suffer from anaemia (14).

Reviewing our data, we discovered some inaccuracies concerning delayed delivery of the placenta. We observed seven manual removals of the placenta, but we only recorded data on interventions prior to the procedure in one of them. It is unlikely that the placentas were removed manually without first trying less invasive methods. We assume that the reason behind this is that we did not know when the placenta was considered delayed and that we did not immediately review our case report forms to reveal mistakes. Several studies have demonstrated that CCT reduces the risk of manual removal of placenta (21, 23, 24). This speaks in favour of practicing the procedure, given the settings at JUSH. The manual removals we witnessed were performed without anaesthesia, an extremely painful procedure.

We lack observation data for the duration of the third stage of labour, nevertheless it is our impression that this phase generally went by rapidly. This is compatible with findings in studies, which demonstrate that CCT reduces the duration of third stage of labour (21, 23, 24). Even though WHO argues that this reduction is small, it might influence the logistics, as the labour room only had four beds. On the other hand, CCT is a procedure which interferes with normal birth and delivery, and it is by some women considered both painful and disturbing when they want to focus on their newborn (21). The last argument might not be valid at JUSH, as the current practice is to leave the infants alone during the first period after birth. More important for these women, is the question of whether CCT increases the risk of uterine inversion (21).

Of note, there has been a debate on whether controlled cord traction is compatible with delayed cord clamping. In an article published in BMJ in 2013 the authors claim that CCT should be performed during the first uterine contractions after the birth of the baby and that it is not possible to wait for delayed cord clamping (24). In contradiction, WHO suggests that one does not have to exclude CCT in favour of practising DCC, they recommend both procedures in the third stage of labour (42).

According to the WHO, administration of a uterotonic drug (preferably oxytocin) immediately after birth is considered the most important component in the prevention of PPH (20). At JUSH

all women received oxytocin intramuscularly right after birth. The use of uterotonics is recommended, and can be performed by both skilled and non-skilled birth attendants.

WHO does not recommend continuous uterine massage whether the birth attendants are skilled or not (20). It is emphasized that this does not refer to routine abdominal palpation to identify uterine atony. Continuous uterine massage is contraindicated in women who have received prophylactic oxytocin, because evidence that the practice reduces PPH is lacking and it is an uncomfortable procedure. Our impression was that, compared to routines in Norway, the uterine massage at JUSH was more intense. We did not record assessments of the frequency and duration of external uterine massage in our registration form and therefore cannot definitely declare if the massage can be considered continuous. Another confounding factor is that while practicing CCT, an external counter-pressure on the uterus was performed and this was difficult to distinguish from continuous uterine massage.

To prevent PPH it is also important to have adequate routines regarding inspection of the placenta as well as estimation of the postpartum blood loss (19, p. 207). If these components are not present, it is difficult to discover the source and cause of a potential haemorrhage. In 73% of the deliveries we observed no inspection of the placenta. We consider this finding worrisome, as visual inspection is easy to implement with no need for equipment. As mentioned before, there was no objective assessment of the blood loss, however, we do not know if a routine subjective estimation was a part of the clinical practice. Subjective estimation is not considered optimal as it often leads to underestimation (22), on the other hand, in limited resource settings this might be the only option.

Our data collection on PPH treatment is insufficient, and therefore it is difficult for us to draw conclusions regarding this topic. As mention under results, external massage of the uterus was performed in 16 cases of excessive bleeding postpartum. It is likely that this number is too high due to incorrect registration of our observations. External uterine massage was routinely performed on all women, therefore, we had some difficulties separating this from therapeutic uterine massage as a part of PPH treatment. When we exclude all cases where external uterine massage was the only intervention, patients with excessive bleeding are reduced to 12. We believe this figure is more accurate, as it was our impression that the incidence of excessive

bleeding was not that high. In addition, we have registered nine cases of fluid resuscitation due to excessive bleeding. As we were only observers, we did not question the reason behind the infusion, nor was it explained in the patient record. Therefore, it is likely that there are several reasons behind the figures on fluid resuscitation. Overall, we are uncertain about how many postpartum haemorrhages that occurred during our observation. What we do know is that there were no surgical procedures due to excessive bleeding, and that all 47 women we managed to follow were alive one hour after delivery.

As we have shown in our results, early cord clamping, regardless of the need for resuscitation, was practiced during our observation period in JUSH. This is not in accordance with the international recommendations for cord clamping (42). Several studies have shown that DCC increases iron stores, haematocrit and haemoglobin concentrations in both full term and preterm infants (36, 37, 39- 41). As 44% of children age 6-59 months in Ethiopia suffer from anaemia (9), changing the timing of cord clamping could have a significant impact on the future health of the newborns. Practicing DCC is a cost free and easy way of changing children's iron status compared to dietary changes. Even though studies have failed to show long term benefits (36, 38), it is known that iron deficiency in childhood is associated with cognitive impairment and delayed motor development (42).

With limited access to ultrasound examination and uncertainty concerning the last menstrual period, estimation of pregnancy length is a challenge at JUSH. Consequently, we do not have accurate number for preterm births. However, 15% of the newborns fulfilled the criteria for low birthweight (LBW). For preterms/low-birth-weight infants, the potential benefits from practicing DCC are greater than for full-term infants. ECC in preterms increases the risk of necrotizing enterocolitis, intraventricular haemorrhage and late-onset sepsis (39, 40), conditions with a high morbidity and/or mortality which require advanced treatment. At JUSH there is no facility for providing blood transfusions, yet another argument to implement DCC, as it reduces the need for blood transfusions caused by anaemia and hypotension (39, 40). Another positive effect from practicing DCC is that it facilitates early skin-to-skin contact, as it is natural to place the newborn on the mother's chest while waiting (41). Early skin-to-skin contact, also called kangaroo mother care, has improved outcomes for LBW/preterm infants (43). The method enhances successful

breastfeeding, as it leads to earlier initiation. It has also been suggested that it reduces the risk of hypothermia and is comforting for the newborn and its mother.

Unfortunately, we did not measure the temperature at the maternity ward, but we experienced that it was quite chilly in the evening, as there was no heating in the building and doors and windows were constantly open. The lowest average night-temperature in Jimma city ranges between 7 and 13 degrees Celsius (17). As we observed few temperature measurements being performed on the newborns, it brings up the question whether some of them might have been suffering from hypothermia.

The concerns about DCC have been that it might increase the risk of jaundice, polycythaemia and vertical transmission of HIV from the mother. Some studies have shown a slight increase in the risk of developing enough jaundice to require phototherapy, but no increased risk of severe jaundice (36, 39). At JUSH, phototherapy is not available. However, we do not consider this to be a good reason not to practice DCC, as the increased risk is minor and the benefits from DCC are numerous and more significant. Regarding polycythaemia and HIV transmission, studies have not revealed increased risk (36, 44).

Overall, DCC is an intervention that is beneficial for the neonates and facilitates the transition from intrauterine to extrauterine life. Maternal effects have also been studied thoroughly and the conclusion is that DCC does not increase maternal bleeding or the length of the third stage of labour (36, 42).

ETHICAL CONCERNS

During our study period at JUSH no written informed consent was provided for the patients. We had almost no direct contact with the women and as far as we know they were not informed about the reason for our presence. Sadly, we observed three incidents where senior consultants physically assaulted patients and we did not act to stop this. Even though it is uncertain what kind of impact an intervention on our part would have had, we felt that by being silent observers, we accepted the assaults. For the record, this information was brought to the attention of the directors

at JUSH. Another ethical problem was that we on several occasions witnessed substandard resuscitation of newborns without intervening. Before going to Ethiopia, we had been trained in neonatal resuscitation procedures by prof. Hansen, and although none of us were highly skilled, we still felt that we might have done a potentially better job than what we witnessed being done. For instance, on several occasions the resuscitation process was delayed, for different reasons, and if we had intervened the hands-off time might have decreased.

LIMITATIONS/BIAS

Due to the size of our study, there are several limitations regarding the impact of our findings. As mentioned before, we weren't there during the night, due to perceived lack of safety. It is possible that the data we now have could differ from the data we might have collected during night because the population of parturients could vary during 24 hours. Two other potential confounders we are especially aware of are the big changes in temperature with low night-time temperatures, and the possible difference in attendance of health care professionals at night.

Another potential bias is that we do not speak nor understand any of the Ethiopian languages. All of the health care professionals spoke very good English, so we had no problem communicating with them, however, we missed all the communication between the patients and the health care professionals. There might be other differences that we are not aware of. Therefore it is not given that the population we observed is representative for all the women who delivered at the maternity ward, this leads to a reduction in the generalizability of the results from our study.

To avoid bringing more bias into our data collection we had agreed beforehand to maintain a passive role and not to intervene in the clinical practice at the ward.

CONCLUSION

As our study is observational, we only have data regarding the management/procedures. The quality of our figures varies, but the ones involving our study questions we consider to be of good quality. Based on our data we can therefore conclude that except the practice of early cord

clamping, active management is the routine approach to the third stage of labour in JUSH. Despite the great deal of research done on the effectiveness of AMTSL, consensus on the importance of the individual components has not been reached. There are several ongoing trials concerning the benefits from delayed cord clamping, hopefully they can be more conclusive regarding the long term effects.

Because we did not do any form of interventions, we have no data regarding outcomes from our observations. Consequently, we relied on research literature and guidelines to draw conclusions when we evaluated the approaches. Controlled cord traction and timing of cord clamping and cutting are both subjects that have been thoroughly investigated and debated. We assume that the outcomes from this research can be applied to JUSH and that the WHO guidelines should be implemented. We think that our study is a good starting point in the process of generating future projects at the maternity ward at JUSH.

REFERENCES

1.1uptravel [Internet]. Brechin, Scotland: 2015 [cited 2015-05-08].
Available from: http://www.1uptravel.com/international/africa/ethiopia/maps.html

2. Ethiopian Government Portal [Internet]. Addis Ababa, Ethiopia: 2012 [cited 2015-05-08].
Available from: http://www.ethiopia.gov.et/web/Pages/Geography

3. Embassy of The Federal Democratic Republic of Ethiopia [Internet]. London, England: 2015 [cited 2015-05-08]. Available from: http://www.ethioembassy.org.uk/about_us/population.htm

4. Briggs P., Blatt B. Background information. Ethiopia. 5th ed. Bucks, England: Bradt Travel Guides Ltd; 2009. pp. 7-32.

5. Thomson.A. An introduction to African politics. 2nd ed. Oxon, England: Routledge; 2004. 284 pp.

6. BBC News [Internet]. London, England: 2008 [cited 2015-05-08].
Available from: http://news.bbc.co.uk/2/hi/africa/7420212.stm

7. Voice of America [Internet]. Washington D.C., US: 2012 [cited 2015-05-08].
Available from: http://www.voanews.com/content/proxy-war-stokes-tension-between-ethiopia-eritrea-143416866/179733.html

8. Globalis [Internet]. Oslo, Norway: UN Assosiation of Norway; 2015 [cited 2015-05-08].
Available from: http://www.globalis.no/Land/Etiopia/(show)/indicators

9. Central Statistical Agency, ICF International. Ethiopia Demographic and Health Survey 2011. Addis Ababa, Ethiopia and Maryland, US: Central Statistical Agency, ICF International; 2012.

10. Store norske leksikon [Internet]. Oslo, Norway: Foreningen SNL; 2015 [cited 2015-05-08].
Available from: https://snl.no/Etiopia#menuitem4

11. Central statistical agency [Internet]. Addis Ababa, Ethiopia: 2013 [cited 2015-05-08]. Available from: http://www.csa.gov.et/

12. Ethiopian Demography and Health [Internet]. Addis Ababa, Ethiopia: 2011 [cited 2015-05-08]. Available from: http://www.ethiodemographyandhealth.org/SNNPR.html

13. Globalis [Internet]. Oslo, Norway: UN Assosiation of Norway; 2015 [cited 2015-05-08]. Available from: http://globalis.no/Land/Etiopia

14. Hadis M., Woyessa A. Prevention of Postpartum Hemorrhage in Rural Ethiopia (SURE policy brief). Addis Ababa, Ethiopia: Technology Transfer and Research Translation Directorate, Ethiopian Health and Nutrition Research Institute; 2012.

15. United Nations Development Programme [Internet]. New York, US: 2015 [cited 2015-09-17].
Available from: http://www.undp.org/content/undp/en/home/mdgoverview/mdg_goals/mdg4/

16. Ethiopian Government Portal [Internet]. Addis Ababa, Ethiopia: 2012 [cited 2015-05-08]. Available from: http://www.ethiopia.gov.et/regional-states

17. World weather online [Internet]. Manchester, England: 2012 [cited 2015-06-10]. Available from: http://www.worldweatheronline.com/Jimma-weather-averages/ET.aspx

18. Jimma-University-Specialized-Hospital [Internet]. Jimma, Ethiopia: 2014 [cited 2015-09-17]. Available from: http://www.ju.edu.et/jimma-university-specialized-hospital-jush

19. Bergsjø P., Maltau J. M., Molne K., Nesheim B. I. Obstetrikk og Gynekologi. 2nd ed. Oslo, Norway: Gyldendal Norsk Forlag AS; 2010. 472 pp.

20. World Health Organization. WHO recommendations for the prevention and treatment of postpartum haemorrhage. Geneva, Switzerland: WHO; 2012.

21. Hofmeyr G. J., Mshweshwe N.T., Gülmezoglu A. M. Controlled cord traction for the third stage of labour. CDSR [Published online]. 2015 Jan [cited 2015-01-30];1:22 pp. Available from: http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD008020.pub2/full

22. Beringer R. M., Patteril. M. Puerperal uterine inversion and shock. BJA. 2004 Jan; 92(3): 439-441.

23. Du Y., Ye M., Zheng F. Active management of the third stage of labour with and without controlled cord traction: a systematic review and meta-analysis of randomized controlled trials. Acta Obstet Gynecol Scand. 2014 Jul; 93:626-633.

24. Deneux-Tharaux C., Sentilhes L., Maillard F., Closset E., Vardon D., Lepercq J. et al. Effect of routine controlled cord traction as part of the active management of the third stage of labour on postpartum haemorrhage: multicentre randomised controlled trial (TRACOR). BMJ [Published online]. 2013 Mar [cited 2015-01-30];346:16 pp. Available from: http://www.bmj.com/content/346/bmj.f1541

25. Stokke O. Utredning av anemi. I: Hagve T. A. Klinisk biokjemi og fysiologi. Oslo, Norway: Gyldendal Norsk Forlag; 2009. pp 53-66.

26. Benoist B., McLean E., Egli I., Cogswell M. Worldwide prevalence of anaemia 1993–2005: WHO Global Database on Anaemia. Geneva, Switzerland: WHO; 2008.

27. Lissauer T., Clayden G. Illustrated textbook of paediatrics. 4th ed. London, England: Elsevier Limited; 2012. 533 pp.

28. Fürst medisinsk laboratorium [Internet]. Oslo, Norway: 2015 [cited 2015-06-10]. Available from: http://www.furst.no/analyse-og-klinikk/referense/#012

29. Perinatology.com [Internet]. West Covina, US: Focus Information Technology; 2010 [cited 2015-06-10].

Available from: http://perinatology.com/Reference/Reference%20Ranges/Hematocrit.htm

30. Schoenwolf G. C., Bleyl S. B., Brauer P. R., Francis-West P. H. Larsen's Human Embryology. 4th ed. Philadelphia, US: Churchill Livingstone Elsevier; 2009. 687 pp.

31. Farrar D., Airey R., Law G. R., Tuffnell D., Cattle B., Duley L. Measuring placental transfusion for term births: weighing babies with cord intact. Bjog [Published online]. 2010 Nov [cited 2015-06-10];118:5 pp. Available from: http://onlinelibrary.wiley.com/doi/10.1111/j.1471-0528.2010.02781.x/pdf

32. Commitee on Obstetric Practice with the assistance of the American Academy of Pediatrics. Timing of Umbilical Cord Clamping After Birth. ACOG. 2012 Dec;120:1522-6.

33. Pushpa-Rajah A., Bradshaw L., Dorling J., Gyte G., Mitchell E., Thornton J. et al. Cord pilot trial - immediate versus deferred cord clamping for very preterm birth (before 32 weeks gestation): study protocol for a randomized controlled trial. Trials [Published online]. 2014 Jun [cited 2015-06-10]; 15(1)258:11 pp.
Available from: http://www.trialsjournal.com/content/15/1/258

34. Downey C., Bewley S. Historical perspectives on umbilical cord clamping and neonatal transition. JRSM. 2012 Aug;105(8):325-9.

35. Hutchon D. A view on why immediate cord clamping must cease in routine obstetric delivery. TOG. 2008 Apr;10:112–116.

36. McDonald S. J., Middleton P., Dowswell T., Morris P. S. Effect of timing of umbilical cord clamping of term infants on maternal and neonatal outcomes. Cochrane [Published online] 2013 Jul [cited 2015-01-14];44 pp. Available from: http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD004074.pub3/abstract;jsessionid=4FB030FD943C7DB6667343532E608E47.f04t02

37. Andersson O., Domellöf M., Andersson D., Hellström-Westas L. Effect of Delayed vs Early Umbilical Cord Clamping on neonatal outcomes and iron status at 4 months: a randomized controlled trial. BMJ [Published online] 2011 Nov [cited 2015-01-14]; 343:19 pp. Available from: http://www.bmj.com/content/343/bmj.d7157

38. Andersson O., Domellöf M., Andersson D., Hellström-Westas L. Effects of delayed cord clamping on neurodevelopment and infections at four months of age: a randomised trial. Acta Pædiatrica. 2013 Jan;102: 522-531.

39. Backes C.H., Rivera B.K, Haque U., Bridge J.A, Smith C.V., Hutchon D. J. R. et al. Placental Transfusion Strategies in Very Preterm Neonates A Systematic Review and Meta-analysis. Obstetrics & Gynecology [Published online]. 2014 Jul [cited 2015-01-14];124(1):10 pp. Available from: file:///C:/Documents%20and%20Settings/Administrator/Mine%20dokumenter/Downloads/Meta_Analysis-1%20%20Backes%20published.pdf

40. Rabe J. H., Diaz-Rossello L., Duley L., Dowswell T. Effect of timing of umbilical cord clamping and other strategies to influence placental transfusion at preterm birth on maternal and infant outcomes (review). Cochrane [Published online]. 2012 Aug [cited 2015-01-14]; 8: 84 pp. Available from: http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD003248.pub3/epdf/standard

41. Ranjit T., Nesargi S., Suman Rao P. N., Sahoo J. P., Ashok C., Chandrakala B. S. et al. Effect of Early versus Delayed Cord Clamping on Hematological Status of Preterm Infants at 6 wk of Age. Indian J Pediatr 2015 Jan; 82(1):29-34.

42. World Health Organization. Delayed umbilical cord clamping for improved maternal and infant health and nutrition outcomes: Guideline. Geneva, Switzerland: WHO; 2014.

43. World Health Organization, Department of Reproductive Health and Research. Kangaroo mother care: a practical guide. Geneva, Switzerland: WHO; 2003.

44. World Health Organization. Delayed clamping of the umbilical cord to reduce infant anaemia. Geneva, Switzerland: WHO; 2013.

ATTACHMENT

WANT- study:
Woman And Newborn CohorT
in Jimma, Ethiopia 2014
-An observational study

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Content:

Module 1. Mother attended

Observation of clinical routines at mothers' arrival and during delivery

Date and time: _____(dd.mm.yyyy) _____ (00:00)
Blood pressure ☐ Measured:_____ ☐ Recorded ☐ No
Temperature ☐ Measured:_____ ☐ Recorded ☐ No
Urine dip stix ☐ Yes ☐ No
Protein ☐ Measured: _____ ☐ Recorded ☐ No
Gluc ☐ Measured: _____ ☐ Recorded ☐ No
Leuk ☐ Measured: _____ ☐ Recorded ☐ No
Hemoglobin ☐ Measured: _____ ☐ Recorded ☐ No
HIV ☐ Yes ☐ No ☐ Unknown status
Hepatitis ☐ Yes ☐No ☐ Unknown status
ABO-blood type ☐ Determined: _____ ☐ Recorded ☐ No
Rh type ☐ Determined: _____ ☐ Recorded ☐ No
Does she have a health card or other paper from health worker ☐ Yes ☐ No

Status

Examination of the fetal position and presentation
Leopold maneuver/ abdominal palpation ☐ Performed ☐ Recorded ☐ No
Position of presenting part in pelvis ☐ Performed ☐ Recorded ☐ No
Assessment of cervical opening ☐ Performed ☐ Recorded ☐ No
Assessment of sutures and fontanels ☐ Performed ☐ Recorded ☐ No
Frequency of contractions ☐ Measured: _____ ☐ Recorded ☐ No
Fetal heart rate ☐ Measured: _____ /min ☐ Recorded ☐ No

Other information recorded by interview

Obstetrical variables/history:
Reason for referral to hospital:
_____
Recording of illnesses during pregnancy; which illnesses:
_____

Known term date? ☐ Yes:_____ ☐ No
Based on ☐ Ultrasound ☐ LMP
How is pregnancy duration estimated? _____
Parity; number of previous deliveries: _____
Number of children alive now: _____
Number of stillbirths or newborn death first week (perinatal mortality): _____
Deceased children at the age of 7-28 (neonatal mortality): _____
Deceased children after 28 days of age: _____
At what age? _____
Abortions: _____

Maternal demographics:

Maternal age: _____ years
Language spoken: ☐ Oromo ☐ Amharic ☐ Other: _____
Mothers or fathers cell phone number: _____
Residence; distance from hospital: _____

Module 2. Delivery
First and second stage of labour:

Who are present at the delivery
Number of persons: _____
Professions:
☐ Midwife ☐ Medical student ☐ Nurse ☐ Ob-Gyn doctor
☐ Other: _____
Spouse ☐ Yes ☐ No
Other relatives ☐ Yes, number?_____ ☐ No
Use of partogram ☐ Yes ☐ No
Repeated examinations during delivery:
Blood pressure ☐ Measured _____ ☐ Recorded ☐ No
Temperature ☐ Measured_____ ☐ Recorded ☐ No
Position of presenting part in pelvis ☐ Performed ☐ Recorded ☐ No
Assessment of cervical opening ☐ Performed ☐ Recorded ☐ No
Assessment of sutures and fontanels ☐ Performed ☐ Recorded ☐ No
Frequency of contractions ☐ Measured _____ ☐ Recorded ☐ No
Fetal heart rate ☐ Measured _____ ☐ Recorded ☐ No
Interventions during labour:
Amniotomy if not ruptured membranes ☐ Performed ☐ Recorded ☐ No
Oxytocin use for labour augmentation ☐ Performed ☐ Recorded ☐ No
Duration of rupture of membranes: _____ hours
Vaginal exploration after rupture of membranes? How often; once per hour?
Describe:_____
_____

Pain relief administered: ☐ Yes ☐ No
Type of pain relief
☐ Morphin injections b. ☐ Nitrous oxide
c. ☐ PCB d. ☐ Pudendal block
e. ☐ Epidural f. ☐ Spinal
g. ☐ Other: _____
Fetal monitoring during delivery
a. ☐ CTG b. ☐ Pinard stethoscope c. ☐ Other: _____ d.☐ No
Duration of second stage of delivery (pushing): _____ min
Perineal protection by hands
☐ One hand slowering the baby's head
☐ One hand protecting the perineum
☐ Using both hands, 1 + 2
☐ Hands-off
☐ Other:_____
Episiotomy ☐ Yes ☐ No
Episiotomy type: ☐ Mediolateral ☐ Lateral ☐ Medial (left or right?)
Perineal tear: ☐ No - intact perineum Degree: ☐ 1. ☐ 2. ☐ 3. ☐ 4.

Mode of delivery
☐ Spontaneous vaginal delivery
☐ Vacuum extraction
☐ Forceps
☐ Caesarean section
☐ Attempted operative vaginal delivery with following cesarean

Fetal presentation
☐ Cephalic normal ☐ Cephalic abnormal: _____ ☐ Breech

Number of babies
☐ One ☐ Twins ☐ Triplets

Indication for operative delivery or caesarean:
☐ Slow progression stage 1 (caesarean only)
☐ Slow progression stage 2
☐ Fetal asphyxia
☐ Fetal infection
☐ Maternal infection
☐ Maternal seizures (Eclampsia, cerebral malaria)
☐ Maternal hypertension or preeclampsia
☐ Other: _____

Third stage of labour:

Time from birth to cutting of umbilical cord in seconds: _____
Where is the baby when umb cord is cut
☐ On mothers chest
☐ Below placenta level
☐ Over placenta level
☐ Other, describe: _____
Postpartum Oxytocin i.m. routinely ☐ Yes ☐ No
Estimation of blood loss? ☐ Yes: _____ ml ☐ No
In case of excessive bleeding:
☐ Fluid recovery
☐ Blood transfusion
☐ Oxytocin
☐ Methergine (methylergometrine)
☐ Misoprostol
☐ External massage of uterus
☐ Other: _____
Procedure if placenta delivery is delayed
☐ External massage of uterus
☐ Oxytocin
☐ Methergine (methylergometrine)
☐ Misoprostol
☐ Other: _____

If manual removal of placenta:
☐ In labour room ☐ In operation theatre
☐ Without anesthesia/pain relief
☐ With pain relief, describe: _____

Placental assessment
Visual ☐ Performed ☐ Recorded ☐ No
Weight ☐ Measured: _____ g ☐ Recorded ☐ No
Cord length ☐ Measured: _____cm ☐ Recorded ☐ No
Describe: _____

Mother alive 1 hour after delivery: ☐ Yes ☐ No

Module 3. Newborn

Who takes care of the newborn – profession:
☐ Midwife ☐ Birth attendant ☐ Nurse assistent ☐ Physician

Born date: _____ (dd.mm.yyy)
Born time: _____ (00:00)
Baby sex: ☐ Girl ☐ Boy
The newborn: ☐ Liveborn ☐ Stillbirth ☐Living after one hour

Attempt of drying the newborn ☐Yes ☐ No
If yes:
How many towels were used:_____
What kind of towels are used
☐ Warm
☐ Not warm
☐ Fabric mother has from home

Bathing of the newborn? ☐Yes ☐ No

Is the baby wrapped? ☐Yes ☐ No
☐ Dry towel
☐ Dry and warm towel
☐ Wet towel (the same as the baby was dried with)
☐ Other:_____

Use of hat/knit cap ☐ Yes ☐No

When after delivery is the baby given to the mother
☐ Immediately on mothers breast (kangaroo)
☐ After wrapping/bath/measures
☐ Describe:_____

Temperature measurement
1) ☐ No
Yes: 2) ☐ Axillary 3) ☐ Rectal 4)☐ Other:_____
When temp measured
☐ 0-5 min
☐ 5-60 min
☐ 1-4 hours
☐ 4-8 hours
☐ >8 hours, still in the hospital
☐ At discharge
Other temperature precautions
☐ Incubator
☐ Warming lamp
☐ Other:_____

K vitamin ☐ Yes ☐No
Anti HIV ☐ Yes ☐No

Newborn measurement:

Birthweight ☐Yes: _____ grams ☐ No
Length ☐Yes _____cm ☐ No
Head circumference ☐Yes _____cm ☐ No

APGAR score ☐Yes ☐ No
☐ 1 min _____
☐ 5 min _____
☐ 10 min _____

Physical examination of newborn at delivery ☐ Yes ☐ No
Describe:_____

Newborn at discharge:
Physical examination of newborn at discharge ☐ Yes ☐ No
Describe: _____
Age of newborn at discharge: _____ hours
Pulse oximetry (foot) at discharge
☐ Yes ☐No
Estimation of gestational age by Finnström method at discharge (weeks)
☐ Yes
☐ Impossible to assess
WHO growth standard
☐ SGA
☐ AGA
☐ LGA

Module 4. Newborn emergency

Tactile stimulation:
☐ Drying with towel
☐ Rubbing the back
☐ Stimulation of sole of the foot
☐ Other
☐ No

Suction meconium ☐ Yes ☐ No

Secure open airways
☐ Positioning of the head
☐ Placing of towel beneath shoulders
☐ No

Ventilation with mask and bag
☐ Use of oxygen
☐ Use of roomair
☐ Use of CPAP/neopuff
☐ No

Assessment of heart rate
☐ Auscultation
☐ Pulse in umbilical cord
☐ Assessment of pulse in brachialis artery
☐ Assessment of pulse in femoral artery
☐ No

Chestcompressions performed ☐ Yes ☐ No

Administration of drugs
☐ Epinephrine
☐ Other
☐ No

Duration of rescusitation measures – minutes: _____ min

Infusion of fluid; type of fluid:_____

Blood samples from umbilical cord ☐ Yes ☐ No

Other:_____