ASPHYXIATED NEONATES

AT THE NEONATAL UNIT OF MUHIMBILI NATIONAL HOSPITAL DAR ES SALAAM

By:

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A dissertation submitted in partial fulfillment of the requirement for the degree of Master of Critical Care and Trauma of the Muhimbili University of Health and Allied Sciences.

Muhimbili University of Health and Allied Sciences

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CERTIFICATION

The undersigned certify that they have read and hereby recommended for acceptance by the Muhimbili University of Health and Allied Sciences a dissertation titled: ***Management of Asphyxiated neonates at the neonatal Unit of Muhimbili National Hospital Dar es Salaam*** in partial fulfillment of the requirements for the degree of master of critical care and Trauma.

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Date..November 9, 2009.....

DECLARATION AND COPYRIGTH

I Angelina Sepeku, declare that this dissertation is my own original work and that it has not presented and will not be presented to any other university for similar or any other degree award.

Signature.....

ACKNOLEDGEMENT

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DEDICATION

I dedicate this dissertation to my beloved husband Mr. B. Sepeku and my children.

ABSTRACT

Background

Birth asphyxia is an important cause of neonatal morbidity and mortality in developing countries. Birth asphyxia continues to present a major clinical problem, and worldwide~ 4million newborn infants are affected annually.

Objective: The broad objective of this study was to asses care given to asphyxiated neonates at neonatal unit Muhimbili National Hospital.

Study design, population and setting: A descriptive cross sectional study involving 190 neonates admitted to the neonatal unit at Muhimbili National Hospital.

Methods: Data was obtained using a checklist for assessing the Management or care given to birth asphyxiated neonates.Demographic data of mother, previous obstetric history, history of current pregnancy, parity, marital status, mode of delivery such as (SVD), (ABD), (LVCE), (C/S), duration of labor, induction, method of induction, apgar score, diagnosis on admission, resuscitation measure and neonate's birth weight was determined.

Results: A total of 190 neonates were included in the neonatal unit Forty (21%) were found with birth asphyxia .Most of asphyxiated neonates 25/40 were referral cases from peripheral hospitals. Majority (62.5%) of asphyxiated neonates died, those with severe birth asphyxia had significantly increased mortality (p=0.000).Lack of resuscitative facilities, technology and shortage of skilled personnel were the biggest problem in birth asphyxia management.

Conclusion and Recommendation: This study has demonstrated that the birth asphyxia has high mortality rate Birth asphyxia is responsible for about one third of neonatal deaths. Lack of facilities, technology and shortage of nurses also were the biggest problem in birth asphyxia management. There is a need to establish a well equipped neonatal intensive care unit.

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LIST OF ABRIVIATIONS

1.	**HIE**	Hypoxic-ischemic encephalopathy.
2.	**PMR**	Perinatal mortality rate.
3.	**SVD**	Spontaneous vertex delivery.
4.	**ABD**	Assisted breech delivery.
5.	**LCVE**	Low cavity vacuum extraction.
6.	**LSCS**	Low segment caesarean section.
7.	**MNH**	Muhimbili National Hospital.
8.	**WHO**	World Health Organization.
9.	**BA**	Birth asphyxia

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CHAPTER 1: INTRODUCTION

1.0 Background Information

Birth asphyxia is defined as a delay in establishing spontaneous respiration upon delivery of a newborn. It causes impaired gas exchange leading to progressive hypoxemia and hypercarpnoea with significant metabolic acidosis (1). Asphyxia causes pulmonary vasoconstriction, tissue hypoxia, acidosis, poor myocardial contractility, bradycardia, and eventually cardiac arrest (2).

The severity of asphyxia is widely assessed by the Apgar score (Apgar 1953).This system was devised by Virginia Apgar in 1952 as a method to assess the well being of a newborn at one and five minutes. It only gives an estimate of severity of asphyxia but not the duration (3). The Apgar score helps to evaluate a newborn infant's condition at birth on the basis of five characteristics: heart rate, respiratory effort, muscle tone, reflex irritability, and colour. For each parameter the infant receives a score of 0 if it is absent, 1 if it is present but abnormal and 2 if it is normal. Traditionally scores are assigned at 1 and 5 minutes, but in prolonged resuscitation a score can be assigned at any time to reflect the condition of the infant and the response to resuscitative efforts recorded in the baby's birth record. With perinatal depression, the Apgar characteristics generally disappear in a predictable manner: first the pink coloration is lost, next the respiratory effort, and then tone, followed by reflex irritability and, finally, heart rate. Return of the characteristics with recovery is not in the same order with tone. The score should be recorded in the baby's birth record (4).

Table 1.1 below shows the apgar score chart which is usually used by health providers midwives /doctors for scoring new born babies soon after delivery.

Table 1 .1: APGAR SCOR

SIGN	**SCORE**		
	0	1	2
Heart rate	Absent	Slow(<100beats/minute)	>100beats/minute
Respirations	Absent	Slow, irregular	Good crying.
Muscle tone	Limp	Some flexion	Active motion
Reflex irritability	No response	Grimace	Cough, sneeze, and cry.
Colour	Blue or pale	Pink body, low extremities	Completely pink

Apgar score does not predict neonatal mortality or subsequent cerebral palsy. Indeed the score is normal in most patients who subsequently develop cerebral palsy, and the incidence of cerebral palsy is very low among infants with Apgar score of 0-3 at five minutes(5). Apgar score at one minute may be used to indicate the need for active

resuscitative measure while the five- minute score appears to correlate better with neurological status at one year (6).

The value of the Apgar score has become controversial because of attempts to use it as a predictor of neurological development of the infant, a use for which it was never intended (7). For example the use of Apgar score to identify birth asphyxia is a misapplication, since condition such as congenital anomalies, preterm birth and administration of some drugs such as pethedine to the mother can result in scores that are not reflective of asphyxia (8). In developing countries like Tanzania newborns are often brought to the neonatal unit from within the hospital or from other hospitals with clear clinical evidence of asphyxia. However, Apgar scores are not well documented or when documented, they do not tally with the condition.

Birth asphyxia is a more serious problem in developing countries, ~6/1000 newborn infants in developed countries develop hypoxic-ischemic encephalopathy (HIE) after birth asphyxia(9), and ~25% of the moderate and 75% to 100% of the severe cases later have major neuro developmental sequelae (10).

1.1 Statement of the Problem

The overall incidence of asphyxia of the newborn is reported to be 22.9% while that associated with low birth weight (i.e. babies weighing less than 2500 grams) is 29.3% compared with 21.5% among the normal birth weight babies (11). Very scanty information is available in East, Central and Southern Africa on the incidence and risk factors associated with asphyxia of the newborn (11).

Tanzania, like other countries in sub-Saharan region has a high perinatal mortality rate ranging from 90 per 1000 births (Tanzania reproductive health survey, 1999) yet most areas of the country do not have access to neonatal Intensive Care Unit (ICU) which will provide capacity to recognize the critically ill child and provide initial resuscitation and stabilization. In Dar es Salaam the problem is the same despite the availability of hospital services; lack of neonatal ICU in many hospitals could cause inappropriate management to birth asphyxiated babies.

Number of factors may play in causing perinatal death of birth asphyxia babies for example it could be lack of neonatal intensive care nurses, lack of intensive care technologists, lack of basic neonatal critical care training for nurses (neonatal advanced life support) so that children are not recognized as being critically ill or resuscitated adequately, lack of modern or advanced equipment, and lack of transport services to facilitate movement of babies from peripheral hospitals to neonatal units. According to MNH report (2007), many critically ill neonates are referred to MNH with total number

of neonates per day about 150 to 180 in the neonatal unit, compared to bed capacity of only 80 cots which is not enough for all critically ill neonates.

The consequences of poor care given to birth asphyxiated babies could lead to high perinatal /neonatal mortality rate, increase of handicapped children which will increase expenses and workload to health care workers, family and community in general. In a poor resource country like Tanzania assessment of avoidable perinatal/neonatal deaths (those due to error or omission on the part of the health service) may help to identify the area most likely to succeed in preventing these deaths and may also give an indication of the performance of the health system. This can greatly have an impact by designing effective measurable interventions with available resources. Therefore, this study intends to look in the management of asphyxiated neonates.

1.2 Objectives of the study

Broad objective

The broad objective of this study was to asses asphyxiated neonates at neonatal unit Muhimbili National Hospital.

Specific objectives

The following were the specific objectives of the study;

1. To determine the proportion of neonates admitted with birth asphyxia at neonatal unit at Muhimbili National Hospital
2. To determine resuscitative measures done at neonatal unit.
3. To identify maternal factor/ characteristics prepartum period, intrapartum period, post partum period of mothers of neonates with birth asphyxia who are admitted at neonatal unit at MNH.

1.3 Rationale of the study

Muhimbili National Hospital has high Perinatal Mortality Rate and birth asphyxia is one of the major causes of perinatal mortality (123/1000 live birth). This study intends to explore the management and this may contribute towards a reduction of perinatal mortality at MNH at is of paramount importance and reduction of number of birth asphyxia can contribute greatly on PMR and neonatal mortality.

1.4 Definitions of terms

1. **Asphyxia:** Is a life-threatening condition in which oxygen is prevented from reaching the tissue by obstruction of or damage to any part of the respiratory system the apgar score is less than 7. (12)

2. **Neonate:** An infant at any time during the first four weeks of life. The word is particularly applied to infants just born or in the first week of life (12)

3. **Apgar Score:** A method of rapidly assessing the general state of a baby immediately after birth. A maximum of 2 points is given for each of the following signs. Usually measured at one minute and five minutes after delivery (12)

4. **Resuscitation:** The restoration of a person who appears to be dead. It depends upon the revival of cardiac and respiratory function (12)

5. **Infant:** Child from one month to one year. (12)

6. **Sampling method:** Sampling is the process of selecting a number of study units from a defined study population

CHAPTER 2: LITERATURE REVIEW

Birth Asphyxia may primarily be due to complications occurring during the different periods of the pregnancy such as preputarm, intraputarm, and post partum. Principle managements which are provided in birth asphyxia include resuscitation and monitoring.

2.1 Birth Asphyxia

Birth asphyxia continues to represent a major clinical problem, and worldwide ~4 million newborn infants are affected annually. It has been estimated that of these, 1 million die, and an approximately equal number develop sequelae such as cerebral palsy, mental retardation, and epilepsy (13). The World Health Organization (WHO) estimates that globally, between four and nine million new born suffer birth asphyxia each year. Of those, an estimated 1.2 million die and almost the same number develop severe consequences. Each year 4 million babies die in the first 28 days of life. In the 42 countries where 90 % of the 11 million deaths in children <5 years occurred, 33 % was due to birth asphyxia, 24 % due to infections , 24% due to complications of prematurity and 7 % due to tetanus (14). Birth Asphyxia is an important cause of preventable neonatal morbidity and mortality in developing countries. Of the 26 million births each year in India 4-6 percent of neonates fail to establish spontaneous breathing at birth. These babies can be helped, if health care professionals present at the time of birth are skilled in the art of neonatal resuscitation.(15) In Uganda the infant mortality is 83/1000 live birth and under 5 mortality is 124/1000 live birth. Birth Asphyxia may account for 24-29 % of neonatal deaths in a resource poor setting, and neonatal death account

approximately half of infant death in Africa (16) Hypoxic Ischemic Encephalopathy (HIE) is the term commonly used to describe the neurological syndromes that occur following perinatal asphyxia. It is usually caused by severe birth asphyxia with secondary cerebral ischemia (17). HIE is known to cause brain damage leading to neuronal loss hence a small brain Although birth asphyxia is a more serious problem in developing countries, still ~6/1000 newborn infants in developed countries develop hypoxic-ischemic encephalopathy (HIE) after birth asphyxia and ~25% of the moderate and 75% to 100% of the severe cases later have major neuro developmental sequelae (18). WHO estimates that 3% of the approximately 120 million infants born every year in developing countries develop birth asphyxia and require resuscitation. Of those, an estimated 900,000 die each year (19). In Tanzania Ministry of Health and Social Welfare, Reproductive and child Health section 2005 reported that, perinatal deaths contribute to a high perinatal mortality rate and high crude estimates ranging from 58-91 per 1000 live birth. In other developing countries birth asphyxia incidence has ranged from 9.4/1000 in Kuwait to 26.5/1000 in Nigeria with mortality rates ranging from 1.1/1000 in Kuwait and 7% in Nigeria (20). A study conducted at Muhimbili National Hospital in Dar es Salaam in 1990 and reported the incidence of birth asphyxia to be 40.5 per 1000 live birth (21). Results from a pilot survey done at Neonatal unit at MNH, found that according to a monthly report of neonatal unit from April to September 2008:

Table 2.1: Shows a pilot survey done at Neonatal unit at MNH.

Date	Total number of neonates admitted	Total number of asphyxiated neonate
April-2008	722	122(16%)
May-2008	709	158(22.3%)
June-2008	654	158(24%)
August-2008	602	165(27%)
Sept-2008	534	154(28.8%)

Another study was conducted in the year 1995 at the same hospital, and showed that among 3886 babies delivered within a three months period 404 (10.4%) were asphyxiated. Birth asphyxia was found to be the second commonest cause of morbidity in neonates admitted at the MNH accounting for 26.4% of all neonatal deaths, being the commonest cause of death(23).

A multicentre prospective study involving 4267 deliveries in eight countries including Tanzania was undertaken over a three month period, in maternity units of the central hospitals to determine the incidence; maternal, service and logistic risk factors for asphyxia of the newborn as determined by an abnormally low apgar score. Thirty percent of births were by primigravida mothers, of whom 67% were teenagers. A birth by a teenager had a higher risk for low birth weight. Overall incidence of low birth weight was 13.9%. The overall incidence of asphyxia of the newborn was 22.9% while that

associated with low birth weight (i.e. babies weighing less than 2500 grams) was 29.3% compared with 21.5% among the normal birth weight babies. Low birth weight contributed a large proportion of the high neonatal mortality of 15.9% compared to 1.8% for normal birth weight babies by 24 hours after birth. The mean mortality by 24 hours post delivery was 3.8%. Obstetrical complications are important risk factors for asphyxia of the newborn. Among the important risk factors are those associated with prolonged labour and intrapartum accidents. The incidence of risk for asphyxia broadly was 21.3%, which is very close to the actual incidence of asphyxia of 22%. Lack of referral contributed to increased risk of asphyxia. In a significant proportion of infants, resuscitation measures taken were inappropriate (24).

Babies may not breathe at birth due to many causes originating at different periods of the pregnancy. A study done by Dilenge et al on risk factors of birth asphyxia and suggested that birth asphyxia may primarily be due to complications occurring during the prepartum (50%), intrapartum (40%), and postpartum (10%) periods.(25),

2.2 Prepartum Period

During this period there are several maternal factors that may contribute the baby to develop birth asphyxia and these include; Maternal age of more than 35yrs or below 16yrs, maternal infections, premature rupture of membrane and anatomical abnormalities of the uterus. Other factors are maternal diabetes, haemorrhage, anaemia, and maternal drug therapy, hypertension, and limited prenatal care, maternal cardiac, renal, pulmonary, thyroid, and neurologic disease (25).

2.3 Intrapartum Period

This is the period during delivery of the baby and the following may cause birth asphyxia Abnormal foetal positioning or presentation e.g. breech position, foetal heart rate abnormalities, size-date discrepancies, maternal or fetal intrapartum blood loss, prolonged or difficult labour, premature labour, prolonged rupture of membranes,(>18 hrs) maternal sedation, anaesthesia, or analgesia, premature labour, precipitous delivery, prolapsed of the umbilical cord, foetal anomalies, meconium-stained amniotic fluid, instrument-assisted delivery (e.g vacuum or forceps) prematurity, sepsis, infection (25).

2.4 Postpartum Period

Babies born with congenital defects such as (e.g. cardiac, respiratory, gastrointestinal, neurologic) may also experience birth asphyxia. There are several symptoms of birth asphyxia; however each baby may experience symptoms differently. Before delivery, symptoms may include: abnormal heart rate or rhythm and an increased acid level in a baby's blood while at birth. Postnatal symptoms of birth asphyxia vary with the degree of severity. It is not certain why some babies' exhibit multi-organ involvement while others have only one or two organ systems involved (26). The main clinical features are generally in agreement worldwide and these tally with the minimal criteria for an asphyxia syndrome. This includes the exhibition of alterations in the state of consciousness and abnormalities of muscle tone (26). Some specific effects of birth asphyxia by organ system include: in the heart; severe or prolonged asphyxia may result

in hypoxic cardiomyopathy that may present with hypotension, poor myocardial contractility, cardiomegaly and heart failure.

In the kidneys; decreased blood flow during an asphyxia event causes acute tubular or cortical necrosis with features of haematuria, proteinuria and oliguria. However this is usually self-limited (26). In gastrointestinal tract; birth asphyxia is usually associated with poor intestinal motility and ileus. The hypoxia also predisposes to secondary bacteria invasion and the development of necrotizing enterocolitis. In the blood; hypoxia from birth asphyxia depresses bone marrow and initiates intravascular coagulopathy, which results in thrombocytopenia, prolonged prothrombin time and partial thromboplastin time and clinical evidence of bleeding (26) .The brain usually bears the most damage in parental asphyxia

Millions of child deaths and stillbirths are attributable to birth Asphyxia, yet limited information is available to guide police and practice, particularly at the community level.(27)

2.5 Principles of Management

The principles management consist of supportive care to maintain temperature, perfusion, ventilation and a normal metabolic state include glucose, calcium and acid-base balance. Early detection by clinical and biochemical complications must be done to prevent extension of cerebral injury. Temperature should be maintained in the normal range of 36.5-37.5c (28).

2.6 Initial Management

The initial management of all such neonates consists of placing the baby under a servo-controlled radiant warmer and Nursing them in the thermo neutral range of temperature Immediate clinical assessment should be monitored on an hourly basis. Check electrolytes. Place an intravenous line and start 10 % dextrose at 60ml/kg/ day. Inj vitamin K 1mg must be administed to all these babies (28).

2.7 Clinical Monitoring

All neonates who have suffered asphyxia must be monitored closely clinically as well as by performing certain bedside tests. This monitoring aims to detect derangements in the clinical, metabolic and hemodynamic milieu so as to ensure prompt management. The respiratory status must be monitored by metialous recoding of the respiration rate, chest expansion and air entry (28). The Cardio Vasculer System status assessment should include Heart Rate, Color, Pulse Oximentry and Temperature. Assessment of neurological status should be included using the Levenes staging for HIE along with assessment of anterior fontanel, tone, seizures. The urine output should be measured as it is a direct indicator of the states of peripheral perfusion.

The resuscitation techniques are considered to be a key intervention for improving health status of neonates with birth asphyxia. Anticipation and preparation for resuscitation requires a comprehensive and multidisplinary approach that integrates national regulatory and institutional guidelines, protocols, procedures (29). Personnel capable of initiating

resuscitation should attend every delivery. A minority (fewer than 10%) of newly born infants require active resuscitative interventions to establish a vigorous cry or regular respirations, maintain a heart rate >100 beats per minute (bpm), and achieve good color and tone. When meconium is observed in the amniotic fluid the responsible personnel should deliver the head, and suck meconium from the hypopharynx on delivery of the head. If the newly born infant is depressed or has no respirations, heart rate <100 bpm, or poor muscle tone, one should carry out direct tracheal suctioning to remove meconium from the airway (29). Establishment of adequate ventilation should be of primary concern. Provide assisted ventilation with attention to oxygen delivery, inspiratory time, and effectiveness as judged by chest rise if stimulation does not achieve prompt onset of spontaneous respirations or the heart rate is <100 bpm(29). Provide chest compressions if the heart rate is absent or remains <60 bpm despite adequate assisted ventilation for 30 seconds. Coordinate chest compressions with ventilations at a ratio of 3:1 and a rate of 120 events per minute to achieve approximately 90 compressions and 30 breaths per minute (29). Administer epinephrine if the heart rate remains <60 bpm despite 30 seconds of effective assisted ventilation and circulation (chest compressions. Medications, volume expansion, and vascular access: Epinephrine in a dose of 0.01-0.03 mg/kg (0.1-0.3 mL/kg of 1:10,000 solution) should be administered if the heart rate remains <60 bpm after a minimum of 30 seconds of adequate ventilation and chest compressions. Emergency volume expansion may be accomplished with an isotonic crystalloid solution or O-negative red blood cells; albumin-containing solutions are no longer the fluid of choice for initial volume expansion. Intraosseous access can serve as an alternative route for

medications/volume expansion if umbilical or other direct venous access is not readily available.

2.8 Summary

Birth Asphyxia continues to represent a major clinical problem worldwide. It is has been known to be an important cause of neonatal morbidity and mortality worldwide, with developing countries been highly affected. There are several factors that attribute to birth asphyxia, such as anemia in pregnancy, hypertension in pregnancy during prepartum period, prolonged labor, and difficult labor during intrapartum period and during post partum period. Resuscitative techniques are considered to be a key intervention for improving health status of neonatal birth asphyxia.

CHAPTER 3: METHODOLOGY

3.1 Settings

This study was conducted at the Muhimbili National Hospital neonatal unit, because neonates from municipal hospitals in Dare es Salaam with birth asphyxia are referred to Muhimbili National Hospital.

3.2 Design

The study was a descriptive crosectional assessing the asphyxiated neonates.

3.3 Study population

Inclusion Criteria

1 .The study included all consenting mothers' with admitted neonates at neonatal unit at MNH.

2. Full term baby

Exclusion criteria

1. Mothers who did not give consent
2. Preterm babies.

3.4 Sampling and sample size

The sample was obtained through a convenience sampling is taken from convenience basis i.e. study units which happen to be available at the time of data collection and asphyxiated neonates were screened as births occurred. Sample size was calculated from the following formula

$n\ z^2 p\,(100\text{-}p)/\varepsilon^2$

Where as

n sample size, p estimated prevalence of neonates admitted due to birth asphyxia and ε margin of error on p. Basing on the pilot study from the monthly reports in which the lowest prevalence was 16% and the highest around 28%, p was put at 22% and the margin of error, ε, onp as 6%. Hence, n=190Therefore, the sample size for this study was 190 neonates with asphyxia at birth.

3.5 Data collection

Data was obtained using a checklist (appendix 1 Checklist for assessing the Management or care given to birth asphyxiated neonates at the neonatal unit of Muhimbili National Hospital, Dar es Salaam.) designed by the principal investigator , the interview took 10 minutes.To obtain demographic data (mother's factors or characteristics) such as age, and other relevant information, including previous obstetric history, history of current pregnancy, parity, marital status, mode of delivery such as spontaneous vaginal delivery (SVD), assisted breech delivery (ABD), low cavity vacuum extraction (LCVE) , caesarean section (C/S) , duration of labour, induction of labour, method of induction, apgar score, diagnosis on admission, resuscitation measure and neonate's birth weight .

Availability of tools for neonatal resuscitation supplies and equipment is shown in Appendix ii. Availability of staff in the neonatal unit at MNH is shown in Appendix iii.

Validity: The degree to which an instrument measures what is intended to measure, for example the instrument question must match the research objectives, or important variables used in the study- see table 3.1 (30)

Reliability: The degree of consistency or dependability with which an instrument measures and attributes or variables (30). The study tool was tested during pilot study and all ambiguous questions were modified. Soon after admission in the neonatal unit data was collected by the researcher by interviewing the participant using a Kiswahili questionnaire in a standardized manner and the tool completed by the researcher before patient discharged. All participants were asked the same questions.

The proposal was given to the supervisor for scrutiny and identification of flaws. The study was subjected for scrutiny by the research of committee of School of Nursing and higher degrees committee of the Muhimbili University of Health and Allied Sciences.

Table 3.1: Framework for data collection tools per study objective

	OBJECTIVE	VARIABLE	TOOL
1.	To describe maternal characteristics of mothers of neonates with birth asphyxia who are admitted at neonatal unit at MNH	Mode of delivery- breech, vacuum delivery, duration of labor	Checklist Appendix I
2.	. To determine the proportion of neonates admitted with birth asphyxia at neonatal unit at MNH	Number of neonates admitted with birth asphyxia	Checklist Appendix I
3.	To asses resuscitative measures done prior to admission	Suction machine, Oxygen, medication	Checklist Appendix II

3.6 Ethical consideration

The study was carried out in accordance with existing ethical guidelines. Research ethical clearance was obtained from the Senate Research and Publication Committee of

MUHAS. A written consent was obtained from each parent/ guardians prior to enrolment (see appendix ii). Information about the study was given to the parents/ guardians to ensure that they had the information needed to make an informed choice and a complete description of the aims of the study. Parents/ guardians who consented for participation were assured of the same quality of care as any other patient. All patients' information was kept confidentially (i.e. by using code number instead of using their names). Data was locked into a filing cabinet. Permission to conduct the study was also sought from Muhimbili National Hospital authorities (appendix ii).

3.7 Data Processing and Analysis

The data obtained was entered, cleaned and analyzed using SPSS for windows. Statistical significance from a comparison of proportions was tested by using the Chi-squared test. A significance level of 0.05 was used. Differences were be considered statistically significant if P-value was less than 0.05.

3.8 Limitation of the Study

Source of data was depending heavily on available records (patients' files). Some of these data are likely to be incomplete. In this case, respective mothers were interviewed to obtain the required information.

3.9 Dissemination of Findings

The copies of dissertation will be disseminated to School of Nursing, library, feed back will be given to stakeholders and participants, and also publish in peer review journal.

Table 4.1: Association of Social demographic characteristics of the mother and birth asphyxia

Variable	Yes	No	Total	P.value
Source of admission				
Muhimbili National Hospital	15(19.2%)	63(80.8%)	78	
Temeke	14(23.0%)	47(77.0%)	61	
Mwananyamala	3 (21.4%)	11 (78.6%)	14	
Amana	8(21.6%)	29(78.4%)	37	
Mother age (in yrs)				
15-24	23(28.0%)	59(72.0%)	82	
25-34	15(15.5%)	12(84.5%)	97	
35-44	2(18.2%)	9(1.8%)	11	
Marital status				
Single	18(34.0%)	35(66.0%)	53	
Married	22(16.7%)	110(83.3%)	132	
Divorced	0 (0.0%)	4(100.0%)	4	
Separated	0 (0.0%)	1(100.0%)	1	
Education				
Informal	11(61.1%)	7(38.9%)	18	0.00
Primary	25(20.0%)	100(80.0%)	125	
Secondary	4(11. 1%)	32(88.9%)	36	
Postsecondary	0(0.0%)	11(100.0%)	11	
Occupation				
Employed	4(10.5%)	34(89.5%)	38	
Non employed	36(23.7%)	116(76.3%)	152	

Table 4 bellow summarizes association between obstetric factor during intrapatum period and birth asphyxia. Most of birth asphyxiated neonates were delivered by SVD 29(72.5%), followed by LSCS 7(17.5%), LVCE 3(7.5%) and only one (2.5%) was delivered by ABD. The table also shows 35(87.3%) of: neonates, their mothers had no induction of labor, whereas five (12.5%) mothers had induction of labor there is strong significant difference (p 0.000).

Table4. 4: Association between Obstetric Factor during Intrapartum Period and Birth Asphyxia

Variable	Yes	No	Total	P.value
Mode of delivery				
SVD	29(72.5%)	105(70.0%)	134 (70.5%)	
ABD	1(2.5%)	6(4.0%)	7 (3.7%)	
LVCE	3(7.5%)	3(2.0%)	6 (3.2%)	
LSCS	7(17.5%)	36(24.0%)	43 (22.6%)	
Induced labour				
Yes	5(100%)	0(0.0%)	5(2.6%)	0.000
No	35(89%)	150(100.0%)	185 (97.4%)	

Table4.5 below shows among the 190 neonates included in this study 40 (21.1%) had birth asphyxia and of these 25(23.6%) were males and 15(17.9) were females.

Table 4. 5: Prevalence of Birth Asphyxia by Sex

Neonates	Yes	No	Total
Male	25(23.6%)	81(76.4%)	106
Female	15(17.9%)	68(82.1%)	84
Total	**40**	**150**	**190**

Table 4. 6 shows the prevalence of birth asphyxia and birth weight of the neonate.

4(10.8%) had birth weight of <2.5kg and 36(23.5%) had birth weight of >2.5 kg.

Table 4. 6: Birth Asphyxia and Birth Weight

Variable	Yes	No	Total
Birth weight.			
<2.5kg	4(10.8%)	33(9.2%)	37(100.0%)
>2.5kg	36(23.5%)	117(76.5%)	153(100.0%)
Total	40(21.1%)	150(78.9%)	190(100.0%)

Table 4. 7 show the severity of birth asphyxia neonates Eight (20%) had mild birth asphyxia. While 15 (37.5%) had moderate birth asphyxia and 17(42.5%) had severe birth asphyxia. Also table 8 show the association between the severities of birth asphyxia with those discharged home or died. All neonates with severe birth asphyxia17 (100%) died. The association was found to be significant difference higher mortality among severe birth asphyxia with (p= 0.000). In moderate birth asphyxia 9(60.05) were discharged home and 6(40.0%) died. In mild asphyxia 6(75.0%) were discharged home and 2(25.0%) died.

Table 4. 7: Birth asphyxia and severity, with Birth asphyxia and outcome

Categories of birth asphyxia	**severity**	**Discharge**	**Death**	**Total**	**P=value**
Mild birth asphyxia	8 (20.0%)	6(75.0%)	2(25.0%)	80(100.0%)	
Moderate birth asphyxia	15(37.5%)	9(60.0%)	6(40.0%)	15(100.0%)	
Severe birth asphyxia	17(42.5%)	0(0.0%)	17(100.0%)	17(100.0%)	0.000

Table 4. 8 shows the monitoring and documentation of the vital signs. Six (3.1%) neonates temperature was monitored, while the rest 34(85.0%) the vital signs were not monitored. Only temperature was checked, heart rate and respiration were not checked or documented.

Table 4. 8: Monitoring of vital sign

Checking vital sign	**No of asphyxiated neonates**	**Percent**
Yes	6	3.1%
No	34	85.0%
Total	40	20.6%

Table 4. 9 shows the type of suction which was used for asphyxiated neonates. Mouth and nasal suction was used in 40(100%) where as tracheal suction was not used.

Table4. 9: Type of suction used

Type of suction	Yes	No
Nasal suction	40(100%)	0
Mouth suction	40(100%)	0
Tracheal suction	0	40(100%)

Table 4. 10 shows most 18 (45%) asphyxiated neonates were given injection dextrose 10%.and six of them were given injection Vitamin K_1 while 40 of them were not given epinephrine and sodium bicarbonate

Table 4.10: Type of medication

Type of medication	Yes	No
Epinephrine	0	40(100%)
Sodium bicarbonate	0	40(100%)
Dextrose 10%	18	22
Injection Vitamin K_1	6	34

Table 4. 11 shows six (3.1%) asphyxiated neonates were breast fed/cup fed orally by their mothers every 3 hours, and 34(17.5%) were fed by NGT every 3 hours by their mothers.

Table 4. 11: Prevalence Birth asphyxia and Type of Feeding

Types of feeding	No of feeding	Percentage
Oral	6	3.1%
NGT	34	17.5%
Total	40	20.6%

Table 12 shows the outcome of birth asphyxiated neonates 15(37.5%) were discharged, and 25(62.5%) died.

Table 12: Birth asphyxia and outcome

Variable	Frequency	Percentage
Discharge	15	37.5%
Death	25	62.5%
Total	40	100%

Table4. 13 shows staff distribution, during the study period in the neonatal unit at MNH. Types of staff, total number of neonates admitted, total number of asphyxiated neonates and total death of asphyxiated neonates.

Table4. 13: Staff distribution and No of neonates in the neonatal unit at MNH

Day-Date	Total No of babies in neonatal ward	No of registered nurses	No of enrolled nurses	No of specialist	No of MD'S (register's)	No of B.A	No of death of B.A.
29-12-2008	169	6	2	3	2	14	0
30-12-2008	177	5	2	3	2	15	4
31-12-2008	177	5	2	2	3	15	2
01-02-2009	179	3	1	2	2	16	0
02-02-2009	162	5	2	3	2	16	1
03-02-2009	150	6	2	2	2	32	5
04-02-2009	142	5	3	2	3	11	1
05-02-2009	154	6	1	2	2	11	1
06-02-2009	160	6	1	2	3	11	2
07-02-2009	137	4	2	2	2	15	3
08-02-2009	137	3	1	2	3	13	2
09-02-2009	153	8	1	3	3	17	1
10-02-2009	147	7	2	2	2	11	1
11-02-2009	144	8	2	2	2	13	2

Table 4. 14 shows availability of resuscitative equipments in the neonatal ward. Suction equipments, oxygen, heating system and medication were available during the time of admission while Intubation equipments and masks and ambu bags where not available.

Table 4. 14: Availability of Resuscitative equipment

Variable	Present	Absent
1. Suction	Yes	No
- Bulb syringe	Yes	No
- Mechanical suction & tubing only 2s suction	Yes	No
- Suction catheter for neonate size (sf,6f,8f)		
2. Mask equipment		
- Neonatal resuscitation bag	No	Yes
- Face masks, for newborn	Yes	No
- Oxygen sources with flow meter		
3. Intubation equipment		
- Laryngo scope with strait blade	No	Yes
- CO_2 detector	No	Yes
- Layrngo mask airway		
4. Medication		
- Epinephrine	Yes	No
- Sodium	Yes	No
- Dextrose 10%	Yes	No
- Inj. vitamin k		
5. Heating system	Yes	No

CHAPTER 5: DISCUSSION

Birth asphyxia is a delay in establishing spontaneous respiration upon delivery of a newborn. The overall prevalence of asphyxiated neonates in this study was found to be 21.1%. This finding is higher than previous findings of birth asphyxia (10.4%) from the study conducted at Muhimbili National Hospital in 1995. The reason for this difference could be inadequate resuscitative facilities and skilled personnel compared to higher number of admission of asphyxiated neonates. The high prevalence was also reported by the World Health Organization (WHO) estimates globally, between four and nine million newborns suffer birth asphyxia each year (31).

Majority (70%) of asphyxiated neonates were referred from peripheral hospital. This may be due to lack of neonatal unit and facilities from peripheral hospital taking in consideration that there is only one neonatal unit at MNH at Dar es Salaam City in Tanzania.

The findings of this study show that the majority (62.5%) of asphyxiated neonates died. This a high mortality rate in which the reason could be due to the fact that referral were made late from peripheral hospital.

This finding is in agreement with previous studies which reported that birth asphyxia may account for 24 29% of neonatal deaths in a resource poor setting where neonatal deaths account for approximately half of infant deaths in Africa (33, 34). The reasons may be due to lack of facilities for close monitoring in the neonatal unit. Another possible explanation is delay in referring asphyxiated neonates from peripheral hospitals.

There is paucity of information about the causes of neonatal deaths in low income countries but it has been estimated that, 29% is due to birth asphyxia (32). Another study done by de L Costello (1994) the incidence of 'birth asphyxia' to be much higher in developing countries, and presents a formidable challenge to health professionals from the point of view of preventative as well as therapeutic interventions (32).

Birth asphyxia was found to be higher (28%) with maternal age younger than twenty four years. This finding concur with the finding by Dilenge et al(2001) who reported that birth asphyxia occurs more commonly in teenagers. This is due to the fact that reproductive organs are not well matured including pelvic disproportion (24).

Women with no formal education were significantly associated with birth asphyxia. The possible explanation for this association may due to poor reproductive health education to these mothers.

In this study hypertension and anemia were the commonest maternal risk factor for birth asphyxia. These conditions cause placenta insufficiency thus reduce oxygen supply to fetus.

Induced labor was significantly associated with birth asphyxia. This finding is consistent with previous studies (4, 35). This may be due to poor monitoring of care during first and second stage of labor.

Suction procedure including mouth and nasal suction were performed to all asphyxiated neonates except those who had meconium aspiration. The reason is that there were no

endotracheal tubes for neonates. According to the standard of WHO It was suggested that if meconium is present in the amniotic fluid or on baby's skin, one should intubate and do suction through the trachea before performing the other resuscitation steps (4, 35).

In the present study it was found that eighteen (45%) asphyxiated neonates had received intravenous dextrose 10%.Among neonates who were given injection vitamin K_1 **only 6 were documented, this indicates that there is a problem in documentation** while injection epinephrine and sodium bicarbonate were not provided. This may be due to lack of skills of administer these drugs. According to WHO guidelines, Epinephrine drug is indicated when the heart rate remain below 60 beats per minutes, epinephrine increases the workload and oxygen consumption of the heart muscles, which in the absence of available oxygen may cause unnecessary myocardial damage. Epinephrine should be given by the most accessible route that will deliver the drug to the heart muscles, the root such as the endotrachial tube and the umbilical vein (4, 35). Also Sodium bicarbonates may be given if all other step of resuscitation has been taken and there is still no improvement. Sodium bicarbonate corrects metabolic acidosis by providing CO_2 and water. However Sodium bicarbonates can be helpful, particularly if given too early in resuscitation (4, 35). These resuscitative measures above are not performed at neonatal unit in MNH due to lack of adequate equipment.

In this study it was found that some of the resuscitation equipment, such as mask equipment, intubation equipment for neonate were not available. This resuscitation equipment is very important for saving asphyxiated neonates. A study done in Uganda

(2006) reported that the basic neonatal resuscitation decrease the incidence of asphyxia and decrease mortality (37). Indeed, our observation differ from Icddr, b study which reported that equipments must be available, in working order, and readily accessible, and providers must have both the necessary competencies to use the equipment as well as the prompt recognition of and action to treat birth asphyxia.(38)

In this study, only 3% of asphyxiated neonates were monitored vital signs, while the rest, thirty four (87.0%), the vital signs were not monitored or documented. Failure of monitoring of vital signs may be due to shortage of nurses.

In the present study, it was found that staff distribution in neonatal unit were not enough. Where in average 156.2 neonates were cared by 5.5 registered nurses, and 2.3 specialist doctors. This observation was in contrast with WHO guidelines in which standard nurses to seriously ill patients is one to one. Study by Wong's(2003) reported that the diversity of special care needs requires that the unit be arranged for graduated care infant population. There should be adequate facilities and skilled personnel to provide one –to – one nursing care for each seriously ill infant, as well as a means for graduation to one-to-three or one-to- four nursing care in a convalescent area where infants require less intensive care until they are ready to leave the unit.(39) .

CONCLUSSION

The problems are still major and context based. These are for example staffing shortage, lack of skills and relevant equipment of resuscitation.

RECOMMENDATIONS

From the findings of the present study I would like to recommend the following:

i) There is a need to improve the quality of neonatal care by establishing a well equipped neonatal intensive care unit with adequate facilities and modern equipment such as Continuous Positive Airway Pressure. (CPAP), mechanical ventilator, cardiac monitor, ABG machine so that quick and effective care is provided.

ii) Provision of resuscitative equipments for asphyxiated neonates to the district hospitals/ health facilities.(Peripheral Hospital) for effective initial resuscitation before referral.

iii) Provision of frequent neonatal resuscitation programs/trainings to nurses and doctors including those in peripheral hospitals.

iv) Further studies are important so as to address the magnitude of birth asphyxia in other areas in Tanzania.

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