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Assessment of Knowledge and Practices on Neonatal Resuscitation among Midwives at Kampala International University Teaching Hospital

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ABSTRACT

A cross-sectional descriptive study was carried out among midwives at Kampala International University Hospital to assess their knowledge and practices on neonatal resuscitation. A sample size of 30 midwives was used. Midwives were selected by using a systematic sampling technique including all midwives who work in the maternity ward and neonatal intensive care unit. More than half 16(53.3%) of the midwives were between 20 – 30 years, and only 1(3.3%) was above 50 years of age. All 30(100%) of the respondents were females. Half 15(50%) of the midwives were enrolled with a certificate in midwifery, 9(30%) were registered midwives, 3(10%) were certificate holders in comprehensive nursing and another 3(10%) were Bachelor holders in nursing sciences. The majority of the midwives 25(83.3%) had last trained in neonatal resuscitation at the nursing school, 3(10%) had last trained in a workshop while only 2(6.7%) had last trained in a CME/CNE. Almost all midwives were knowledgeable about the resuscitation steps of a newborn. The respondents had some knowledge of how to place a face mask on the neonate's face. The majority of the midwives 18(60%) evaluated respirations, heart rate, and color of the neonate while 12(40%) were not observed to monitor heart rate. Three quarters 21(70%) of the midwives were observed correctly providing positive pressure ventilation with a resuscitation bag with supplemental oxygen, and a third 9(30%) did not administer epinephrine with continued ventilation and chest compression. The maternity and neonatal intensive care units were equipped with almost all the required resuscitation equipment except the cardiac monitor, carbon dioxide detector (capnograph), and naloxone hydrochloride injection. The researcher concluded that **the** majority of the midwives had substantial good knowledge of neonatal resuscitation and despite the good knowledge, a significant proportion of them 12(40%) lacked skilled practices on resuscitation.

Keywords: Midwives, Resuscitation, Intensive care Unit, Neonatal, Maternity.

INTRODUCTION

Birth asphyxia is defined as the failure to initiate and sustain breathing at birth [1]. Globally, about one-quarter of all neonatal deaths are caused by birth asphyxia [2, 3]. About 40% of deaths in the under-five occurred in the neonatal period [4, 5]. About 9% of neonatal deaths are caused by asphyxia [6]. Birth asphyxia continues to be a global health problem with at least 10% of the babies requiring resuscitation to establish breathing patterns [7]. WHO [1] has put guidelines in place for healthcare workers to use to resuscitate neonates and reduce the mortality rate. Despite this strategy, the mortality rates are still high and it is not known whether the midwives are directly involved [8-11]. In the UK, the average rate of birth asphyxia is 3%. Asphyxia contributes to 14.4% of death per

100000 live births in the USA representing the 10th leading cause of infant mortality, and worldwide more than 1 million babies die annually from complications of birth asphyxia [12]. The sub-Saharan African region ranks highest globally in neonatal mortality rate [13, 14]. About 10% of the newborn require some assistance to begin breathing (Ceriani, 2012) and studies show that effective resuscitation at birth can prevent a large proportion of these deaths 15, 16]. In Uganda, neonatal death resulting from asphyxia is no different from other regions. For example, in the first 28 days of life, 30 per 1,000 babies die due to asphyxia-related complications [17], and of the 35,000 babies born each year at Mulago Hospital, in Kampala, about 2,500 are admitted to the special baby unit for neonatal resuscitation of whom 12% suffer from birth asphyxia, or difficulty in breathing [18]. In Fort Portal, Of the 2,775 babies who were born between April to December 2013, 48 (1.7%) were severely asphyxiated and 9 (19%) out of 48 died within the first 72 hours of birth [19]. Therefore, this study assessed the knowledge and practices of Midwives and nurses as it applies to neonatal resuscitation at Kampala International University Teaching Hospital in Western Uganda.

Statement of the problem

The Regional Resuscitation Council (WHO, 2012) devised universally recognized clinical guidelines on basic resuscitation of the newborn, suitable for settings with limited resources. In Uganda, (MOH, 2010) universally recognized clinical guidelines on basic resuscitation of the newborn adopted these guidelines and emphasize their implementation by training health workers including 500 midwives, and providing the equipment needed to resuscitate neonates born with birth asphyxia. WHO, (2010) also recommended guidelines for healthcare workers to follow while resuscitating neonates who are born asphyxiated in order to reduce the neonatal mortality rate. Despite this strategy, the mortality rates are still high. According to the maternity register at KIU-TH, a total of 50 babies died of poor neonatal resuscitation-related complications between the years 2013-2015. Therefore, this study assessed their knowledge, practices, and availability of up-date appropriate equipment regarding neonatal resuscitation in order for them to revisit the guidelines formulated to help reduce the neonatal morbidity and mortality rates resulting from poor neonatal resuscitation-related complications.

Aim of study

To identify the knowledge and practices of midwives on neonatal resuscitation in an effort to improve neonatal survival rates at Kampala International University Teaching Hospital (KIU-TH).

Study Objectives

To assess the knowledge, practices, and availability of up-date appropriate equipment for midwives on neonatal resuscitation at Kampala International University Teaching Hospital.

Specific objectives

- To assess the knowledge of Midwives about neonatal resuscitation at Kampala International University Teaching Hospital.
- To assess the practices of midwives at Kampala International University Teaching Hospital regarding neonatal resuscitation.
- To assess the availability of up-date appropriate equipment midwives use in neonatal resuscitation at Kampala International University Teaching Hospital.

Research questions

i. What knowledge do midwives have regarding resuscitation of the neonate born with asphyxia?

ii. What practices do midwives carry out at birth to resuscitate neonates born with birth asphyxia?

iii. What is the availability and level of modern equipment used in neonatal resuscitation?

Justification for the study

Low knowledge and practices of midwives on neonatal resuscitation pose a big threat to newborn babies who develop asphyxia. This study will therefore help improve their knowledge and practices regarding neonatal resuscitation and be able to save many neonates who develop asphyxia thereby reducing neonatal morbidity and mortality rates related to birth asphyxia.

The findings of this study may be used to improve the knowledge and practices of midwives on neonatal resuscitation and help to reduce morbidity and mortality rates of neonates born with asphyxia. The results may also help the management at Kampala International University Teaching Hospital to re-design strategies and procure modern equipment suiting the local situation that may be used to improve the health of children born with complications arising from poor resuscitation.

METHODOLOGY

Study design and rationale

The study design was a cross-sectional design using a systematic sampling technique to select the respondents. The systematic method was mainly focused on the trained Midwives working in the Maternity or Pediatric wards of KIU-TH.

Area of Study

The study was conducted in Kampala International University Teaching Hospital located in Western Uganda in Bushenyi-Ishaka Municipality. The hospital is situated along the Mbarara-Kasese highway. The hospital has a bed capacity of 450 with existing professional Nurses and Midwives totaling to 100 and out of this 30 are midwives. On average there are 80 deliveries per month. Kampala International University Teaching Hospital was objectively selected for this study due to the high number of deliveries conducted in the facility and the observed common occurrences of deaths arising from birth asphyxia.

Study Population

The target population of the study was qualified midwives. The accessible population were midwives at Kampala International University Teaching Hospital. The study was carried out on midwives working between (8 am to 5 pm) in the labor and postnatal wards, maternity theater and special care unit, and antenatal and family planning clinics. These midwives rotate in all the maternity units and at one time or the other they require to resuscitate a neonate.

Sample Size Determination

Records from the Hospital showed that the total number of midwives working directly with patients and clients (in wards and clinics) is 30. This figure was used to calculate the sample size. The sample size was calculated using the standard formula by Kish and Leslie (1965) for descriptive studies where a fraction of the accessible population was considered.

$$N = \frac{Z^2pq}{d^2}$$

Z = 1.96 (the standard normal deviation at 95% confidence interval)

p = percentage of midwives as compared to the total number of health workers in the Hospital (30/192 x100 =16%)
q = 1-p, = 1 – 0.1= 0.84
d = maximum error the investigator is willing to allow between the estimated prevalence of the problem and the true prevalence in the population (5%).

$$N = \frac{1.96 \times 1.96 \times 0.16 \times 0.84}{0.05 \times 0.05} = 207$$

Since the sample size (207) is more than the total number of Midwives in the Hospital, a modified Kish and Leslie formula (1965) will be used to calculate a new sample size.

$$N = \frac{NZ^2pq}{d^2(N-1) + Z^2pq}$$

Where N= 30 (Total number of midwives in the hospital)
z = 1.96 (the standard normal deviation at 95%confidence interval)

p = percentage of midwives as compared to the total number of health workers in the hospital (30/100 x 100 =16%)
q = 1-p = 1 – 0.16 = 0.84
d = maximum error the investigator is willing to allow between the estimated prevalence of the problem in the people = 5%.

$$N = \frac{30 \times 1.96 \times 1.96 \times 0.16 \times 0.84}{0.05 \times 0.05(30-1) + 1.96 \times 1.96 \times 0.16 \times 0.84}$$

N = 26 respondents.
Since the total number of midwives is 30 and they periodically rotate in various departments, they were all involved in the study in order to bring an equal representation of findings as at one time or the other, one was required to resuscitate a newborn baby. This avoided bias as the difference between the total number of midwives (30) and the sample size (26) is 4.

Sampling procedure

At KIU-TH, there are a total of 30 midwives who work in various departments on a rotational basis and since the sample size is 26 with a difference of only 4, they were, therefore, all involved in the study as at any one time or the other, one may be required to resuscitate a neonate.

A systematic sampling technique was used to select the respondents working in labor and postnatal wards, special care units and maternity theatres, and antenatal and family planning clinics between 8:00 a.m. and 5:00 p.m. This sampling technique was utilized to include all the Midwives in the study.

Inclusion Criteria

The study was carried out on Midwives working day shift (8:00 am to 5:00 pm) in the labor and postnatal wards, maternity theater and special care unit, antenatal and family planning clinics.

Exclusion criteria

The study excluded all midwives who work in administration like the Senior Principal Nursing Officer.

Definitions of variables

A variable is either a result of force or is itself a force that causes a change in another variable which are called dependent and independent variables respectively. In this research, poor neonatal resuscitation was the independent variable and birth asphyxia was the dependent.

Research instruments

A structured Questionnaire was used to assess the knowledge and practices of Midwives regarding neonatal resuscitation. Knowledge was measured using statements where the respondents were required to identify whether it is correct or incorrect. Each correct statement earned a respondent a point while the incorrect was not. Practices were measured by asking the respondent to identify the practices they engage in that are ideal to the practice. A checklist was used to observe actual practices as midwives resuscitate neonates and each correct procedure was awarded a point.

Data collection procedure

The purpose of the research was explained to each respondent and then requested to volunteer for the study. They were then given questionnaires that took about 20-25 minutes to fill. Pre-set questionnaires were administered to the respondents who were requested to write down their responses in the spaces provided in the questionnaire on the same day at any given free time during working hours after which the questionnaires were collected from respondents. This was done to avoid respondents sharing information and duplicating responses. An observation checklist was used to observe the preparation for resuscitation equipment and ticking in the spaces provided if present or not present. Additionally, the participants were observed on the initial steps of neonatal resuscitation during the procedure and whatever step done or not done, a tick shall be indicated in the spaces provided. This process was repeated on each day of data collection until all the 30 Midwives have been reached

Data management

The questionnaire was first checked for completeness before collecting them from the respondents. The data was then coded and tallied manually according to the similarity of responses from the study subjects. A computer program SSPP version 20 software package was used to analyze data.

Data analysis

Data analysis was done manually and the findings were described and illustrated using frequency distribution tables, pie charts, and graphs.

Ethical consideration

An introductory letter was obtained from Kampala International University School of Nursing to the study area. The purpose of the study was explained to the Hospital director of Kampala International University Teaching Hospital who later granted permission to carry out the study. Before proceeding with data collection, respondents were briefed on the importance and purpose of the study. Respondents were explained clearly that there were no incentives after data collection. Respondents were also assured of the utmost confidentiality of their responses and that they are free to quit the study at any point if they so wish. Respondents were assured that there are no risks that are exposed through their participation in the study. The respondents were explained that the only benefit of their participation in the study will participate in reducing neonatal deaths in the hospital and requested respondents to sign a consent form before data collection.

RESULTS

General information

Table 1: shows age of the respondents

The age range in years	Frequency	Percentage
20 – 30	16	53.3
31 – 40	10	33.3
41 – 50	03	6.7
Above 50	01	6.7
Total	**30**	**100**

Slightly more than half 16(53.3%) of the midwives were between 20 – 30 years, 10(33.3%) were between 31 – 40 years, only 1(3.3%) was above 50 years of age.

Table 2: shows sex of respondents

Sex	Frequency	Percentage
Female	30	100%
Male	0	0%

All 30(100%) of the respondents were females, there was no male respondent

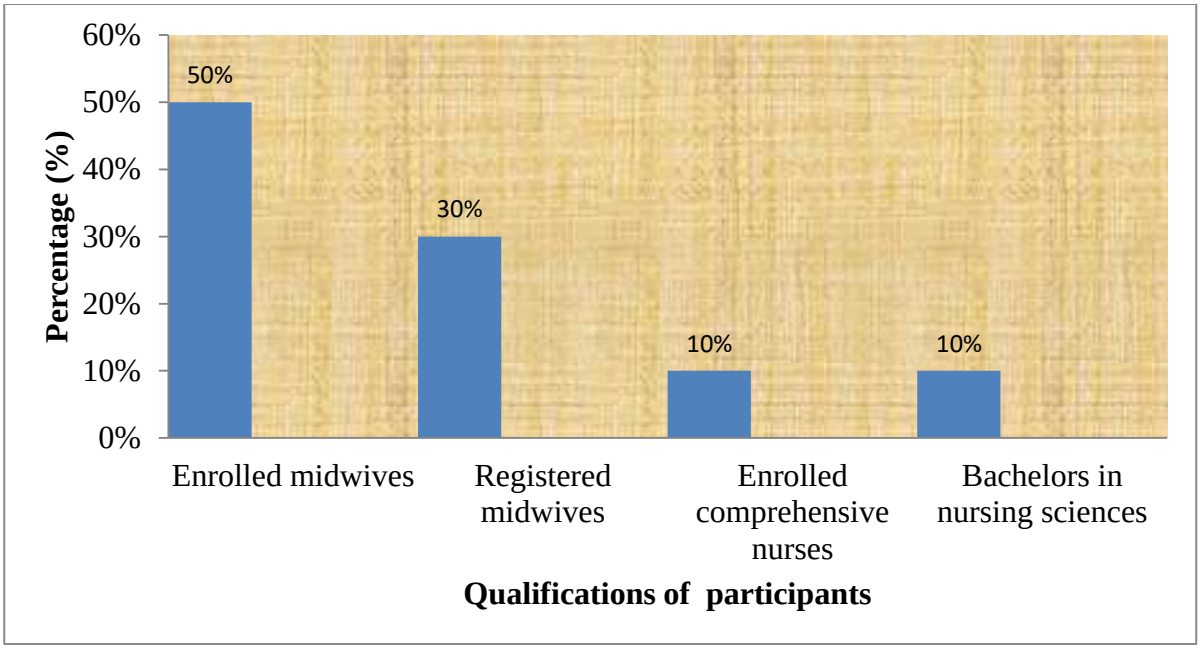

Figure 1: Shows level of qualification of the midwives

A half 15(50%) of the midwives were enrolled with a certificate in midwifery, a third 9(30%) were registered midwives, 3(10%) were certificate holders in comprehensive nursing and another 3(10%) were Bachelor holders in nursing sciences.

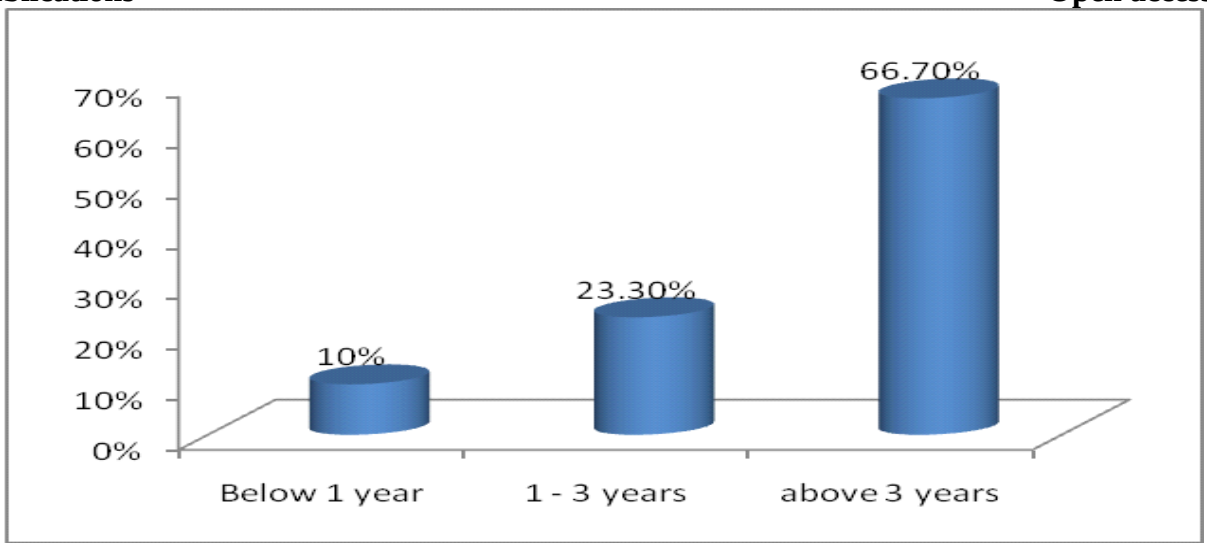

Figure 2: Shows participant's duration in service

Majority of respondents 20(66.7%) had been in service for more than 3 years, while only 3(10%) had been in service for less than a year.

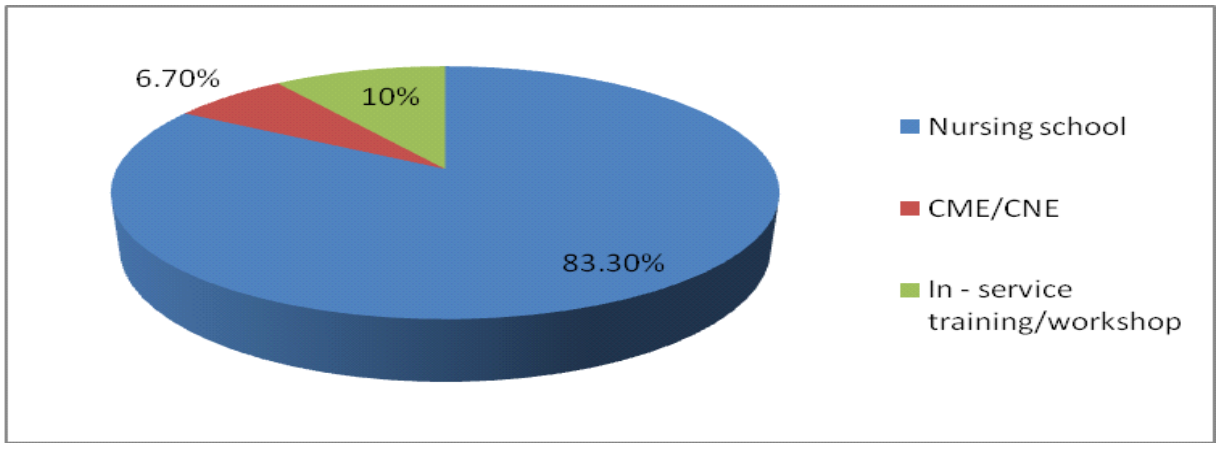

Figure 3: shows place of last training in neonatal resuscitation

The majority of the midwives 25(83.3%) had last trained in neonatal resuscitation at the nursing school, 3(10%) had last trained in a workshop and only 2(6.7%) had last trained in a CME.

Knowledge on Neonatal Resuscitation.

Table 3: Shows Midwives' knowledge on Neonatal Resuscitation.

Items on knowledge	Correct		Incorrect	
Knowledge on neonates who need resuscitation:	Frequency	percentage	Frequency	Percentage
A newborn that is born at term, has no meconium in the amniotic fluid or on the skin, is breathing well, and has good muscle tone, does or does not need resuscitation.	30	100	00	00
A newborn with meconium in the amniotic fluid and who is not vigorous will need to have a laryngoscope inserted and be suctioned with endotracheal tube	30	100	00	00
A newborn is covered with meconium, is breathing well, has normal muscle tone, has a heart rate of 120 bpm, and is pink; insert a laryngoscope and suction his trachea with an endotracheal tube (correct answer is suction the mouth and nose with a bulb syringe or suction catheter)	21	70	9	30
If baby is in secondary apnea and is not responding to stimulation, the next step is to administer positive-pressure ventilation	30	100	00	00

Almost all midwives were knowledgeable on the resuscitation steps of a new born except a knowledge gap was identified on a newborn who is covered with meconium but breathing normally with good muscle tone and is pink

where 9(30%) of the midwives indicated that the newborn should have an endotracheal tube inserted to suction the trachea of mucus while the correct answer was indicated by 21(70%).

Table 4: Shows knowledge of respondents on how to place face mask

Mask is placed on the face so that it covers the nose and mouth, and tip of the chin rests within the rim of the mask.	30	100	00	00
When placing a mask on the newborn's face it is helpful to first cover the nose then cup in the chin (correct answer is the opposite).	3	10	27	90
While holding the mask on the face with the thumb, index and or middle finger encircling the rim of the mask, the ring finger and the thumb lift the chin forward to maintain a patent airway.	30	100	00	00
Anatomically shaped masks should be positioned with the pointed end over the chin in order to form an air tight seal.	6	20	24	80

The respondents had some knowledge of how to place a face mask on the neonate's face. However, all the midwives had no knowledge of where to start applying the mask where almost 27(90%) were wrong to indicate that it is not helpful to first cover the nose and then cup in the chin, while only 6(20%) of the respondents indicated the correct practice of positioning the pointed end of the mask over the chin while the majority 24(80%) indicated an opposite wrong practice.

Table 5: Shows steps in neonatal resuscitation

Steps of neonatal resuscitation				
Initial steps	**Done**		**Not done**	
Provide warmth by placing baby under a radiant warmer or heat source.	30	100%		
Positioning head by slightly extending the neck in order to clear the airway.	15	50%	15	50%
Drying and stimulating baby to breath.	30	100%		
Evaluating respirations, heart rate and color.	18	60%	12	40%
Providing positive-pressure ventilation with a resuscitation bag and supplemental oxygen.	21	70%	9	30%
Providing chest compressions as they continue assisted ventilation.	21	70%	9	30%
Administering the epinephrine as they continue assisted ventilation and chest compression.	03	10%	27	90%

The majority of the midwives 18(60%) evaluated respirations, heart rate, and color while 12(40%) were not observed to monitor heart rate. Three quarters 21(70%) of the midwives were observed correctly providing positive pressure ventilation with a resuscitation bag with supplemental oxygen, and a third 9(30%) did not administer epinephrine with continued ventilation and chest compression.

Table 6: Shows preparation of a delivery place for neonatal resuscitation

Items	Present	Not present
Staff (responsible for receiving baby).	✓	
Preparation of labor ward.		
Room temperature.	✓	
Radiant warmer or any other heat source.	✓	
Firm, padded resuscitation surface.	✓	
Clock or timer.	✓	
Warmed linen (warn baby clothing and blanket).	✓	
Stethoscope.	✓	
Measuring tape, ½ or ¾ inch.	✓	
Cardiac monitor and electrodes or pulse oximeter and probe.		✓
Oropharyngeal airway tubes.		

Equipment		
Suction equipment		
Bulb syringe.	✓	
Mechanical suction and tubing.	✓	
Suction catheters.	✓	
Feeding tube and 20 mL syringe.	✓	
Meconium aspirator.	✓	
Bag-and –mask equipment.		
Device for delivering positive pressure ventilation.	✓	
Face mask with cushioned rim (newborn and premature sizes).	✓	
Oxygen source with flow meter and tubing.	✓	
Intubation equipment.		
Laryngoscope with straight blades No. 0 (preterm) No. 1 (term).	✓	
Extra bulbs and batteries for laryngoscope.	✓	
Endotracheal tubes.	✓	
Scissors.	✓	
Tape for securing device for Endotracheal tube.	✓	
Alcohol sponges.	✓	
CO_2 detector or capnograph.		✓
Laryngeal mask.	✓	
Medications.		
Epinephrine, normal saline, or ringer's lactate for volume expansion.	✓	
Naloxone hydrochloride.		✓
Dextrose 10%.	✓	
Umbilical vessel catheterization supplies		
Sterile gloves.	✓	
Scalpel or scissors.	✓	

Antiseptic preparation solution.	✓
Umbilical tape.	✓
Umbilical catheters.	✓
Three-way stopcock.	✓
Syringes 1, 3, 5, 10, 20, 50 ml.	✓
Needles, 25, 21, 18 gauge or puncture device for needleless systems.	✓

The maternity and neonatal intensive care units are equipped with almost all the required resuscitation equipment except the cardiac monitor, carbon dioxide detector (capnograph), and naloxone hydrochloride injection.

DISCUSSION

Slightly more than half 16 (53.3%) of the midwives were between 20 – 30 years, and only 1(3.3%) was above 50 years of age. This indicates that most of the obstetric and neonatal care is provided by young professional midwives. This implies that they could have completed their professional training a few years ago and could be in their early years of professional practice. Young practitioners may be characterized by a narrow spectrum of experience in neonatal resuscitation and are still in the process of perfecting their professional skills [20-26]. All 30(100%) of the midwives were females, there was no male respondent. This may be due to the fact that training schools have traditionally recruited females to study midwifery and consequently the only ones available for recruitment in midwifery practice. Sex orientation may not have a significant impact on the knowledge and practice of a midwife on neonatal resuscitation. Half 15(50%) of the midwives were enrolled with a certificate in midwifery, a third 9(30%) were registered midwives, while an equal number of them 3(10%) were diploma holders in comprehensive nursing and double trained midwives respectively. This indicates that a significant proportion of practicing midwives are low-cadre midwives who may still be in the process of perfecting their professional neonatal care skills. However, earlier findings by Waldemar et al. [20] on the educational impact of the neonatal resuscitation program in low-risk delivery centers in a developing country conducted to improve knowledge, skills, and self-efficacy of nurse midwives involving 127 working in low-risk clinics in Zambia showed that pre-training knowledge and skills scores were relatively low despite their advanced formal training. The majority of respondents 20(66.7%) had been in service for more than 3 years, while only 3(10%) had been in service for less than a year. This implies that almost three-quarters of the midwives should have attained a level of professional proficiency in obstetric and neonatal care.

The majority of the midwives 25(83.3%) had last trained in neonatal resuscitation at the nursing school, 3(10%) had last trained in a workshop while only 2(6.7%) had last trained in a CME/CNE. This implies that there are limited chances at the hospital of strengthening knowledge and skills attained during pre-service training. This may result in fewer chances of adopting new improved methods of performing certain tasks since healthcare guidelines keep changing as more information and facts are discovered through research and experimentation. Almost all midwives had good basic cognitive knowledge of the resuscitation steps of a newborn. The knowledge gap was only identified in a newborn who is covered with meconium but breathing normally with good muscle tone and is pink where 9(30%) of the midwives indicated that the newborn should have an endotracheal tube inserted to suction the trachea of mucus while the correct answer was indicated by 21(70%) who indicated that the newborn should be suctioned in the mouth and nose with a bulb syringe or suction catheter. This finding is similar to what was earlier reported by Laurel et al. [21], in their study on midwives' baseline cognitive knowledge of evidence-based neonatal resuscitation practices and the impact of training programs on midwife's knowledge and retention which involved midwives on the labor ward at Ridge Hospital in the written evaluation of neonatal resuscitation skills after training. In his study, he noted that if midwives are trained, they receive knowledge on basic neonatal resuscitation, retain it for some period and self-sustaining neonatal resuscitation programs can be successfully created in a resource-poor environment.

All the respondents indicated the correct actions on how to place a mask on the face of the neonate. In addition, the majority of the midwives 18(60%) correctly evaluated respirations heart rate, and color while 12(40%) were not

observed to monitor heart rate. Only a third 9(30%) of the midwives were observed correctly providing positive pressure ventilation with a resuscitation bag with supplemental oxygen, and the majority 27(90%) did not administer epinephrine with continued ventilation and chest compression. This indicates that the significant good knowledge observed among the midwives does not translate into an equivalent good practice. This may be due to the fact that most of the midwives are still young in the profession and are still in the process of perfecting their resuscitation skills. The study findings are similar to the findings of a case-control interventional semi-experimental study by Niknafs et al. [22] on 89 nurses and midwives in Kerman Province Hospitals to assess their practices on neonatal resuscitation in which it was revealed that teaching alone may not increase resuscitation skills and knowledge; but other factors like age of the midwife working experience, exercise, and study may have an influence too. The maternity and neonatal intensive care units are equipped with almost all the required resuscitation equipment except the cardiac monitor, carbon dioxide detector, and naloxone hydrochloride injection. This was a good observation which indicates that most of the basic equipment necessary for neonatal resuscitation is readily available in both the maternity and neonatal intensive care unit. Therefore, if the midwife is knowledgeable enough and skilled in performing the resuscitation on the newborn, she would have all that it takes to resuscitate a newborn with birth asphyxia and save its life.

CONCLUSIONS

- The majority of the midwives had substantial knowledge of neonatal resuscitation
- Despite the good knowledge, a significant proportion of them 12(40%) were observed to miss some crucial steps in neonatal resuscitation like monitoring heart rate, while the majority 27(90%) did not administer epinephrine with continued ventilation and chest compression.

RECOMMENDATIONS

- Since the hospital already has an established CME/CNE program, it is necessary to include neonatal resuscitation sessions regularly.
- Those in charge of maternity in collaboration with the ward doctor in charge should organize regular CMEs on neonatal resuscitation to keep the midwives practically able to offer neonatal resuscitation.
- The maternity ward in charge should put in place a system of inducting new midwives into the maternity on how to offer neonatal resuscitation.
- The Ministry of Health should print and disseminate job aides summarizing the key steps of neonatal resuscitation which must be displayed in all maternity centers, especially in resuscitation rooms.
- The maternity ward in charge and the other senior midwives in the hospital should regularly provide support supervision on junior staff, especially on neonatal resuscitation.
- A neonatal resuscitation team should be formed to ensure sustainable support of midwives on neonatal resuscitation.
- Audit the files of neonates who die shortly after birth to establish the possible cause of death and identify the steps that could have been missed and consequently led to death.
- The hospital medicines procurement unit should regularly order Naloxone injections.

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