Journal of Midwifery & Reproductive Health

JMRH.mums.ac.ir

Healthcare Workers' Knowledge and Strategies for the Prevention and Management of Neonatal Sepsis in Nigeria

Adekemi Eunice Olowokere (PhD)[1]*, Aanuoluwapo Omobolanle Olajubu (MSc)[1], Chinenye Gift Onyemaobi (BSc)[1], Idowu Emmanuel Olowokere (MSc)[2], Tinuke Oyedeji (MSc)[2]

[1] Department of Nursing, Obafemi Awolowo University, Ile-Ife, Osun State, Nigeria
[2] Department of Obstetrics and Gynaecology, University College Hospital, Nigeria

ARTICLE INFO

Article type:
Original article

Article History:
Received: 05-Nov-2017
Accepted: 09-June-2018

Key words:
Knowledge
Practice
Neonatal sepsis
Healthcare worker

ABSTRACT

Background & aim: Sepsis is a major cause of neonatal mortality in the developing countries. The prevention and management of this infection require informed workforce and availability of necessary resources and equipment. Regarding this, the present study was conducted to investigate healthcare workers' neonatal sepsis knowledge; prevention and management strategies in use for the control of the infection as well as barriers to prevention and management of this infection.

Methods: This descriptive cross-sectional study was conducted among 300 healthcare workers selected through purposive sampling technique. To collect data a self-structured questionnaire, containing 42 items in three sections including socio-demographic data, knowledge regarding the causes, prevention, and management of neonatal sepsis and also barriers to the prevention of neonatal sepsis was used. Data analysis was performed using descriptive statistics and Chi-square test. P-value less than 0.05 was considered statistically significant.

Results: The results show that the majority of respondents (79.4%) had a good level of knowledge regarding the causes, prevention, and management of neonatal sepsis. However, 20.3% and 0.3% of them had fair and poor levels of knowledge in this regard, respectively. The healthcare workers' knowledge level was significantly associated with their profession (X^2=10.30, df=4, p=0.036) and health institutions (X^2=32.45, df=6, p=0.001). The most frequently utilised prevention strategies among the respondents were equipment sterilization, regular changing of bed sheets, and safe delivery practices. The most frequently adopted management strategies mainly included use of antibiotics and effective breastfeeding. Additionally, the barriers to the prevention and management of neonatal sepsis were identified as poor staffing, parents' inability to pay for services, and lack of the necessary equipment and resources.

Conclusion: As the findings indicated, it is essential to provide the healthcare workers with in-service education on neonatal sepsis. In addition, it is required to improve the availability of equipment and other resources for the prevention and management of neonatal sepsis.

▶ *Please cite this paper as*:
Eunice Olowokere A, Omobolanle Olajubu A, Gift Onyemaobi C, Emmanuel Olowokere I, Oyedeji T. Healthcare Workers' Knowledge and Strategies for the Prevention and Management of Neonatal Sepsis in Nigeria. Journal of Midwifery and Reproductive Health. 2018; 6(3): 1356-1366. DOI: 10.22038/jmrh.2018.27343.1298

Introduction

Neonatal morbidity and mortality remain a large component of disease burden in the sub-Saharan Africa. The rates of neonatal morbidity and mortality could be linked to the efficiency and effectiveness of healthcare services in any nation (1-3). Neonatal death accounts for more than 40% of all mortalities among the children under the age of five years (4). A review of 32 studies conducted in the developing countries suggested that infections

* *Corresponding author:* Adekemi Eunice Olowokere, Department of Nursing, Obafemi Awolowo University, Ile-Ife, Osun State, Nigeria. Tel: 002348050502125; Email: ayaolowo@yahoo.com

may be responsible for 8-80% of all neonatal deaths and as many as 42% of deaths in the first week of life (5).

In the same vein, the studies conducted across Nigeria have reported infection as the most common cause of mortality in neonatal period (6-8). Regarding this, the paradox of an ongoing, but easily preventable, cause of high mortality raises important questions for policy makers and health systems in Africa (9). The growing rate of neonatal morbidity and mortality in Africa has become worrisome, especially with regard to the neonates who continue to die as a result of preventable causes, such as neonatal sepsis.

This circumstance is indicative of a gap between the reality of neonatal sepsis as a major cause of neonatal mortality and the available measures to control this disease. Addressing such gaps is important for Nigeria to attain the Sustainable Development Goal 3 for improving health status and promoting wellbeing in all age groups.

In the developing countries, healthcare workers employ different strategies for the prevention of neonatal sepsis. These strategies include umbilical cord care, minimization of invasive procedures, breastfeeding, hand washing, barrier nursing, restriction of antibiotics, rationalization of admission to neonatal units, close involvement of mothers, restriction of contact, and droplet isolation precautions (10-14). Furthermore, management strategies in this regard involve early and exclusive breastfeeding (15), use of appropriate antibiotics (16), and implementation of other symptomatic management measures.

However, in most of the developing countries, the effectiveness of these preventive and management strategies is mitigated by various factors, such as knowledge deficit of the healthcare workers in handling the newborn, home birth (9), delay in illness recognition and care seeking on the part of the parents, and lack of basic equipment and facilities for the resuscitation and treatment of neonatal infections.

There are multiple studies investigating the prevention and management of neonatal sepsis. However, most of the available studies on neonatal sepsis in Nigeria have been focused on disease pathology and effectiveness of the administered antibiotics. Despite the involvement of nurses and other healthcare workers in neonatal care, limited studies have assessed the knowledge and practices of this group. There are studies conducted on nurses and other healthcare workers in the developed countries; nonetheless, their findings cannot be generalized across countries due to the differences in the socioeconomic, cultural, religious, literacy level, and other factors of the study population that affect their perception of neonatal care.

It is expected that the findings of this study could play a part in the development of capacity building programs on the prevention and management of neonatal sepsis for the different groups of healthcare workers. Our findings would also provide a basis for the inspection of facilities that will enhance the safe practices of the healthcare workers, irrespective of the work practice environment.

With this background in mind, the present study was conducted to assess the healthcare workers' knowledge on neonatal sepsis and its causes, signs, prevention, and management. We also aimed to investigate the current neonatal sepsis prevention and management strategies in use by healthcare workers, the availability and functionality of the associated equipment and resources, and the barriers to the prevention and management of this disease.

Materials and Methods

Research Design

This descriptive cross-sectional study was conducted in selected health facilities in Ife Central, a local government area (LGA) in Ile-Ife, Osun State, Nigeria, in October, 2014. Ife Central is a medium-sized town in the eastern part of the state, with a population of about 245,435 people (17). This LGA has about 31 healthcare facilities providing primary, secondary, and tertiary care services. The study population included healthcare workers (with the exclusion of medical doctors) who attended and cared for neonates in the selected facilities. They included nurses, community health workers, and community health extension workers.

The LGA used for the study was purposively selected out of the four LGAs that make up Ife

municipality, due to its high population density, compared with that of others. Furthermore, the selected LGA houses most of the healthcare facilities that serve as referral points for health care facilities in the other LGAs. Out of the 31 healthcare facilities in the LGA, 9 facilities were selected, constituting 30% of the total facilities in the LGA. The tertiary institution and comprehensive health centres were purposively selected given the population of women and neonates they serve. Others were selected by the simple random sampling technique using balloting.

Finally, one tertiary health care facility, two comprehensive health centres, four primary health care centres, and three private hospitals were selected for the study. The sample size was determined using the standard formula ($n=z^2pq/d^2$) for cross-sectional study (18); where, *n* represents the desired sample size, *z* signifies the standard normal deviate, usually set at 1.96 that corresponds to 95% confidence interval, *p* is the proportion in the target population estimated to have good knowledge of neonatal sepsis prevention and management, *q* equals to 1.0-p, and *d* is the degree of accuracy desired, usually set at 0.05.

The study utilised a pilot study conducted on the population in another setting where 75.2% of the healthcare workers had adequate knowledge about the prevention and management of neonatal sepsis. The sample size was estimated as 288 cases, which was approximated to 300 subjects to allow for sample loss. The number of the healthcare workers that participated from each facility was determined using the proportional method. The healthcare workers who worked in the maternity and neonatal units of the selected facilities were contacted and briefed about the study. The healthcare workers who consented to participate were recruited for the study.

The data were collected by means of a structured questionnaire, containing 42 items in three sections. The first section was comprised of six items enquiring the socio-demographic characteristics of the respondents. The second section assessed the healthcare workers' knowledge regarding the causes, prevention, and management of neonatal sepsis in 28 items. Correct options to the knowledge questions were assigned a score of 1, while wrong options were given 0. The scores were converted into percentages, and the respondents who scored < 50%, 50-59%, and 60% ≤ were rated as having poor, fair, and good levels of knowledge, respectively.

The last section included eight items focusing on the identification of the barriers to the prevention of neonatal sepsis. In addition, the author used an observational checklist to assess the availability of equipment and medical resources for the prevention and management of neonatal sepsis in the healthcare facilities under investigation.

A pre-test was carried out at the State Hospital, Okeigbo, Nigeria, to ascertain the validity of the research questionnaire. Necessary adjustments were made afterwards to improve the clarity of the instrument. The reliability of the instrument was also evaluated using the test-retest method rendering a correlation coefficient of 0.75. The questionnaire was self-administered, and the data were collected over a period of two weeks across the seven days in the week.

Statistical analysis

The data were analysed in SPSS software (version 17) using descriptive statistics (pie chart, bar graph, and tables) and Chi-square test (to test the association between variables). P-value less 0.05 was considered statistically significant.

Ethical considerations

Ethical approval (IPHOAU/12/247) was granted from the Ethics Committee of the Institute of Public Health, Obafemi Awolowo University, Ile-Ife. Informed consent was obtained from each respondent using the informed consent form approved by the Ethical Review Board. The participants were assured of the confidentiality of their responses and informed about the probability to withdraw from the study at any time. Furthermore, the researchers used anonymous numbers on the questionnaires to ensure the privacy of the participants. Moreover, all copies of the questionnaire used for data collection were locked in a safe that was accessible only for the researchers.

Results

A total of 300 healthcare workers, representing 85.7% of the healthcare workers working in the maternity and neonatal units of the selected healthcare facilities, participated in the study. In this regard, 73%, 16%, and 11% of the respondents were nurse-midwives, community health extension workers, and community health officers, respectively. Out of the 300 participants, 275 subjects were female, giving a male: female ratio of 1:11. The highest educational qualification possessed by the majority of the respondents (73.3%) was diploma in nursing and community health practice. The participants' mean duration of work experience was 7.30±6.92 years. The details of other socio-demographic data of the respondents are tabulated in Table 1.

Table 1. Socio-demographic characteristic of respondents

Socio-demographic variables	Frequency (n=300)	Percentage (%)
Age (year)		
20-30	122	40.7
31-40	139	46.3
41-50	26	8.7
50≤	13	4.3
(Mean: 33.22±7.78, range: 20-56)		
Gender		
Male	25	8.3
Female	275	91.7
Profession		
Nurses	219	73.0
Community health officer	33	11.0
Community health extension worker	48	16.0
Educational Qualification		
Academic degree	36	12.0
Diploma	220	73.3
Technician	44	14.7
Years of experience		
<5	153	51.0
6-14	83	27.7
15≤	64	21.3
(Mean: 7.30±6.92)		
Health institution		
Tertiary	80	26.7
Secondary	71	23.6
Primary	81	27.0
Private	68	22.7

Knowledge about causes, prevention, and management of neonatal sepsis

The descriptive statistics of the respondents' knowledge regarding neonatal sepsis are presented in Tables 2 and 3. Furthermore, the summary of the participants' knowledge on the causes, signs, symptoms, prevention, and management of neonatal sepsis are depicted in Figure 1. According to the results, 79.4% (n=238), 20.3% (n=61), and 0.3% (n=1) of the participants had good, fair, and poor levels of knowledge about neonatal sepsis, respectively.

Table 5 shows the association between the respondents' socio-demographic characteristics and their level of knowledge on neonatal sepsis causes, signs, prevention, and management. The respondents' level of knowledge regarding neonatal sepsis was significantly associated with their profession (X^2=10.30, df=4, p=0.036) and health institution (X^2=32.45, df=6, p<0.001).

Prevention and management strategies for controlling neonatal sepsis

The most frequent neonatal sepsis prevention strategies mainly adopted by the

Table 2. Respondents' knowledge of neonatal sepsis causes, signs, and management (n=300)

Knowledge Items	Agree n (%)	Undecided n (%)	Disagree n (%)
Knowledge of neonatal sepsis			
Neonatal sepsis is synonymous with jaundice	105 (35.0%)	19 (6.3%)	176 (58.7%)
Neonatal sepsis could be temporary or permanent	160 (53.3%)	78 (26.0%)	62 (20.7%)
Neonatal sepsis could be early or late	219 (73.0%)	58 (19.3%)	23 (7.7%)
Causes			
Maternal malnutrition	218 (72.7%)	47 (15.7%)	35 (11.6%)
Evil spirit	52 (17.3%)	51 (17.0%)	197 (65.7%)
Black fly	26 (8.7%)	58 (19.3%)	216 (72.0%)
Knowledge of neonatal sepsis signs			
Lethargy	270 (90.0%)	27 (9.0 %)	3 (1.0%)
Fever	289 (96.3%)	5 (1.7%)	6 (2.0%)
Full black hair	79 (26.3%)	36 (12.0%)	185 (61.7%)
Poor sucking	215 (71.7%)	19 (6.3%)	66 (22.0%)
Knowledge of neonatal sepsis management			
Early and exclusive breastfeeding	262 (87.3%)	26 (8.7%)	12 (4.0%)
The use of antibiotics	278 (92.7%)	13 (4.3%)	9 (3.0%)
Exposing the neonate to fresh air	50 (16.7%)	66 (22.0%)	184 (61.3%)
Shaving the neonate's head	25 (8.3%)	90 (30.0%)	185 (61.7%)
Herbal remedies	67 (22.3%)	46 (15.3%)	187 (62.4%)

Table 3. Respondents' knowledge of neonatal sepsis prevention (n=300)

Variables	Agree	Undecided	Disagree
It is needed to use protective barriers in neonatal unit to prevent neonatal sepsis.	248 (82.6%)	23 (7.7%)	29 (9.7%)
Bed sheets should be changed regularly to reduce infection in neonatal unit.	274 (91.3%)	18 (6.0%)	8 (2.7%)
All equipment used in the neonatal unit should be sterilized.	275 (91.7%)	6 (2.0%)	19 (6.3%)
Avoidance of artificial nails by health care personnel is important in the prevention of neonatal sepsis.	204 (68.0%)	72 (24.0%)	24 (8.0%)
Cutting the nails is important in the prevention of neonatal sepsis.	218 (72.6%)	17 (5.7%)	65 (21.7%)
The removals of rings prevents neonatal sepsis.	229 (76.3%)	29 (9.7%)	42 (14.0%)
Safe delivery practices are important for preventing neonatal sepsis.	266 (88.6%)	26 (8.7%)	8 (2.7%)
Maternal health education on prevention of infection is not important in the prevention of neonatal sepsis.	255 (85.0%)	8 (2.7%)	37 (12.3%)
Clean cord practices after delivery are important in preventing neonatal sepsis.	240 (80.0%)	25 (8.3%)	35 (11.7%)
Minimizing invasive procedures is crucial for preventing neonatal sepsis.	249 (83.0%)	40 (13.3%)	11 (3.7%)
Exclusive breastfeeding prevents neonatal sepsis.	235 (78.4%	49 (16.3%)	16 (5.3%)
Hand washing before and after every procedure is important.	265 (88.3%)	20 (6.7%)	15 (5.0%)
Active involvement of mothers in care promotes neonatal sepsis.	218 (72.7%)	46 (15.3%)	36 (12.0%)

respondents included equipment sterilization (92.0%), regular changing of bed sheets (91.3%), safe delivery practices (89.0%), health education (84.7%), minimization of invasive procedures (83.3%), use of protective barriers (83%), clean cord practices (79.7%), exclusive breastfeeding (78.3%), removal of rings (76.8%), and avoidance of artificial nails (68%), respectively.

Furthermore, the strategies applied by the

majority of the respondents for managing neonatal sepsis were the use of antibiotics

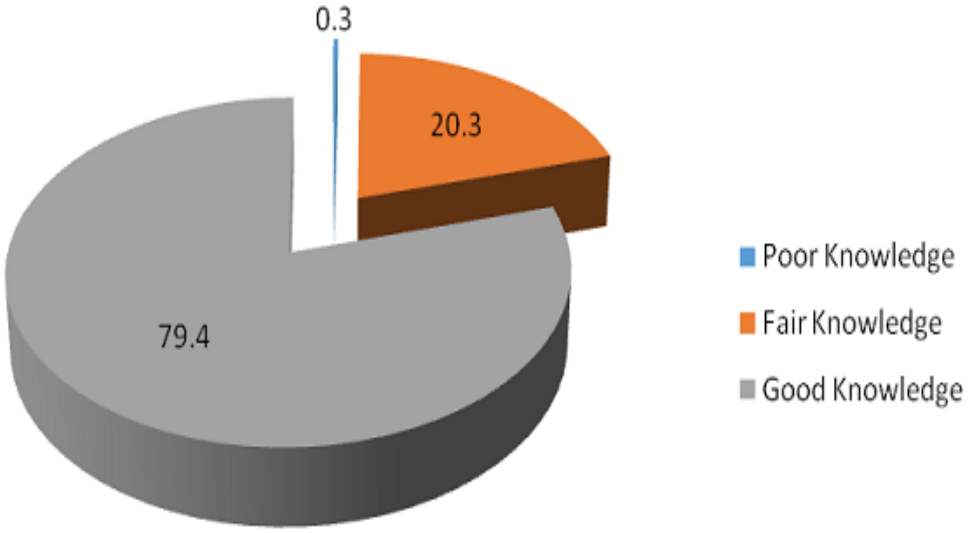

Figure 1. Respondents' knowledge of neonatal sepsis causes, management, and prevention

Table 4. Distribution of health institutions based on their facilities for the prevention and management of neonatal sepsis

Facilities	Availability and functionality (n=9)		
	Available (functioning)	Available (not functioning)	Not available
A neonatal intensive care unit	3 (33.3%)	1 (11.1%)	5 (55.6%)
Trained staff in neonatal care	3 (33.3%)	2 (22.3%)	4 (44.4%)
Hospital infection control committee	3 (33.3%)	2 (22.3%)	4 (44.4%)
Regular disinfection in the hospital	3 (33.3%)	2 (22.3%)	4 (44.4%)
Gloves	7 (77.7%)	2 (22.3%)	0 (0.0%)
Free flowing water	1 (11.1%)	3 (33.3)	5 (55.6%)
Sufficient bed sheet for changing	5 (55.6%)	2 (22.2%)	2 (22.2%)
Available oxygen and oxygen room	1 (11.1%)	3 (33.3)	5 (55.6%)
Blood transfusion services	4 (44.4%)	2 (22.2%)	3 (33.3%)
An incubator	1 (11.1%)	3 (33.3)	5 (55.6%)
A standard laboratory	4 (44.4%)	1 (11.2%)	4 (44.4%)
A sterilising unit for instrument	2 (22.2%)	5 (55.6%)	2 (22.2%)
An effective referral system	4 (44.4%)	5 (55.6%)	0 (0.0%)
Closed doors and windows	2 (22.2%)	7 (77.8%)	0 (0.0%)
Air conditioner	3 (33.3%)	6 (66.7%)	0 (0.0%)
Monitors	3 (33.3%)	6 (66.7%)	0 (0.0%)
Mothers bay (room reserved for mothers to stay during neonatal admission)	1 (11.1%)	3 (33.3)	5 (55.6%)
Mothers' gown and slippers	4 (44.4%)	5 (55.6%)	0 (0.0%)
Nurses' gown and slippers	2 (22.2%)	2 (22.2%)	5 (55.6%)
Electricity	8 (88.9%)	1 (11.1%)	0 (0.0%)
Baby's cots	5 (55.6%)	1 (11.1%)	3 (33.3%)

Table 5. Association between respondents' socio-demographic and knowledge of neonatal sepsis

Socio-demographic variables	Level of Knowledge			χ^2	df	P-value
	Poor	Fair	Good			
Age (year)						
20-30	1 (0.8)	24 (19.7)	97 (79.5)			
31-40	0 (0.0)	31 (22.3)	108 (77.7)	2.40	6	0.879
41-50	0 (0.0)	4 (15.4)	22 (84.6)			
50≤	0 (0.0)	2 (15.4)	11 (84.6)			
Gender						
Male	0 (0.0)	3 (12.0)	22 (88.0)	1.28	2	0.527
Female	1 (0.4)	58 (21.1)	216 (78.5)			
Profession						
Nurse	0 (0.0)	50 (22.8)	169 (77.2)	10.30	4	0.036
Community health officer	0 (0.0)	2 (6.1)	31 (93.9)			
Community health extension worker	1 (2.1)	9 (18.7)	38 (79.2)			
Educational qualification						
Academic degree	0 (0.0)	5 (13.9)	31 (86.1)	0.316	2	0.854
Diplomates	0 (0.0)	47 (21.4)	173 (78.6)			
Technician	1 (2.2)	9 (20.5)	34 (77.3)			
Years of experience						
<5	1 (0.7)	30 (19.6)	122 (79.7)	3.15	4	0.534
6-14	0 (0.0)	14 (16.9)	69 (83.1)			
15≤	0 (0.0)	17 (26.6)	47 (73.4)			
(Mean: 7.30±6.92)						
Health institution						
Tertiary	1 (1.2)	6 (7.4)	75 (92.6)			
Secondary	0 (0.0)	26 (36.6)	45 (63.4)	32.45	6	0<001
Primary	0 (0.0)	8 (10.1)	71 (89.9)			
Private	0 (0.0)	21 (30.9)	47 (69.1)			

(93%) and encouragement of effective breastfeeding (87.3%). Moreover, a few of the respondents encouraged the use of herbal remedies (22%), exposure of neonate to fresh air (15.7%), and head shaving (8.3%).

Barriers to the effective management of neonatal sepsis

As stated by the majority of the respondents, the barriers to the effective management of neonatal sepsis included poor staffing (93.3%), payment difficulty (87.3%), inadequate healthcare resources (87%), mothers' non-cooperation with aseptic measures (86.3%), and late arrival to health facility (82.7%). In addition, more than half of the respondents (61%) indicated overcrowding in the neonatal unit and inefficient hospital policy on neonatal discharge as the barriers to the management of neonatal sepsis. Figure 2 displays the details in this regard.

Assessment of the resources for the control and management of neonatal sepsis

The hospital neonatal units and departments were checked for various equipment and resources needed for neonatal care. As demonstrated in Table 4, the majority of the facilities lacked the basic resources required for the prevention and management of neonatal sepsis. Based on the observation, the tertiary health facility under investigation had almost all the items on the checklist, which were also functioning.

Only one of the private facilities (i.e., mission hospital) had about 50% of the items on the checklist; however, the primary health facilities and other private hospitals had little or none of these facilities. Generally, the results showed that the existing equipment and resources in

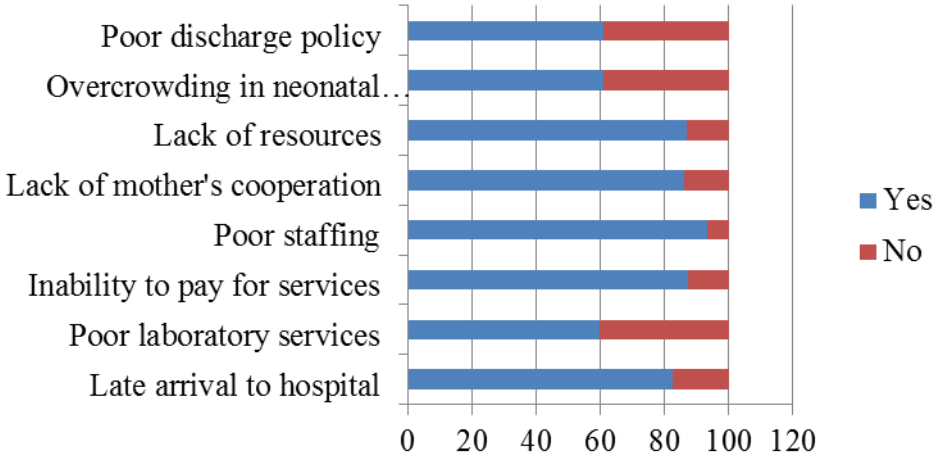

Figure 2. Barriers to the prevention of neonatal sepsis as reported by respondents

most of the facilities were inadequate to prevent and manage neonatal sepsis.

Discussion

The findings of the present study revealed that the majority of the healthcare workers had a good level of knowledge on the causes, signs, prevention, and management of neonatal sepsis. However, some of the healthcare workers still hold to some myths about neonatal sepsis. Furthermore, the results were indicative of a significant association between the respondents' knowledge of neonatal sepsis and their profession and institution. The selected healthcare facilities had inadequate equipment and resources for the prevention and management of neonatal sepsis. Furthermore, the key barriers to neonatal sepsis prevention and management were identified as poor staffing, inability to pay for services, and inadequate healthcare resources.

Addressing neonatal morbidity and mortality is a key to the maintenance of child health in any nation. According to Ayiasi et al., the healthcare workers attending to prenatal and postnatal mothers play a significant role in achieving this goal (19). The majority of the healthcare workers who participated in the present study were nurse-midwives. Likewise, in a study performed by Plotkin *et al.* (20), most of the individuals providing care for the prevention and management of common maternal and neonatal complications were nurse-midwives.

Base on Yassin *et al*. (21), nurses constitute the single largest group of healthcare professionals involving in neonatal care. Therefore, their level of knowledge regarding neonatal sepsis prevention and control is highly imperative. Our findings regarding the respondents' level of knowledge on neonatal sepsis are inconsistent with those obtained in another study reporting health workers' inadequate or no knowledge of neonatal care and management of neonatal sepsis (21).

In the present study, despite the respondents' high level of knowledge on neonatal sepsis, some old beliefs and misconceptions regarding the causes and management of neonatal sepsis were still found. For instance, some of the respondents believed that neonatal sepsis might be caused by evil spirit and could be managed by herbal remedies, exposure of the neonates to fresh air, and shaving their heads. This has implication for maternal health education by health workers. This finding highlights the need for the exploration of healthcare workers' values and beliefs regarding neonatal care in an educational package to be used in continuous educational programs.

The level of knowledge about neonatal sepsis and its management was not significantly associated with the educational qualification of the respondents. This is in disagreement with the results reported by Sessa et al. (22), demonstrating a significant difference in health

workers' knowledge according to their education level. However, a higher proportion of the university graduates had good knowledge about neonatal sepsis, compared to others. This may be explained by the fact that those with university education have been exposed to wider curriculum and self-motivated learning. Moreover, these individuals are likely to have greater knowledge of disease pathology and management than other health workers with lower academic qualifications.

This study revealed that the healthcare workers' profession and health institutions were significantly associated with their level of knowledge on neonatal sepsis. The number of the community health officers displaying good level of neonatal sepsis knowledge was greater, compared to the number of the nurse-midwives. It is assumed that nurse-midwives would have better knowledge level due to their educational preparation when compared with other categories of staff. However, the number of other categories of staff that participated in the study might have contributed to the result. A different result might be observed if equal proportions of healthcare workers were sampled.

A higher proportion of the healthcare workers from the tertiary institution showed a good level of knowledge regarding neonatal sepsis and its management in comparison to those from the secondary and primary health care facilities. This is expected because the tertiary institution is mainly a teaching institution. The healthcare workers in such institutions will continually get their knowledge updated during ward round with students and also via a series of seminars that are usually organized for the healthcare workers in the institution.

The prevention strategies adopted by the majority of the respondents in this study supported the findings of other studies assessing the methods of preventing neonatal sepsis (10, 12-14). In the present study, the majority of the respondents agreed that educating mothers about prevention strategy for neonatal infection is highly important. This is in line with the results obtained by Darmstadt et al. introducing maternal education on hygienic birth practices as one of the preventative interventions to decrease the mortality caused by neonatal sepsis (15).

Kennedy et al. reported that only 40% of healthcare workers indicated that the use of rings and artificial nails contribute to neonatal infection (11). However, in the current study, most of the respondents considered these practices to be important in the prevention of neonatal sepsis. The management methods adopted by the majority of the respondents included the use of antibiotics and exclusive breastfeeding, which is in congruence with the findings reported by Zaidi et al. and Darmstadt et al. (15, 16).

However, issues regarding the use of antibiotics in poor resource settings have been a major problem due to the lack of appropriate laboratory facilities to properly diagnose the causative organisms. This has often resulted in resistance and poor prognosis (23). Antibiotics should be used with caution, and only when accurate diagnosis has been made. Breast milk on the other hand contains important immunological factors, some of which have the potential to inhibit the causative pathogens of neonatal sepsis (24). Consequently, the healthcare workers should ensure that neonates are well fed with breast milk while providing other medical and supportive care.

A combination of factors in this study inhibited the management of neonatal sepsis. The factors identified in the present study are similar to those reported in studies conducted in other developing countries (11, 16, 25-28). The previous studies have proposed the lack of equipment, medical supplies, and drugs as the key barriers to the management and control of neonatal sepsis (29, 30). The non-availability/non-functionality of equipment and medical supplies constitutes major constraints for the healthcare workers in providing effective care for the prevention and management of neonatal sepsis.

The results of this study revealed that the healthcare workers were knowledgeable about neonatal sepsis. Neonatal sepsis and its controlling measures are related to institutional problems and policy issues that should be urgently addressed. The barriers to the management and control of neonatal sepsis identified in the present study can assist the

government officials and policy makers to improve their attempt toward the elimination of the associated constraints. Some of these barriers require institutional solutions; for example, the inadequate or lack of necessary equipment, poor staffing, poor laboratory services, and poor discharge policy need the attention of the hospital management board.

There should be a system overhaul to create an enabling environment for improving the prevention and control of neonatal sepsis. Other barriers, such as inability to pay for services by parents, could be also be addressed through the promotion of community health insurance scheme, which could help reduce the out-of-pocket payment that the non-government workers have to pay for receiving care services.

The primary health care facilities, which serve as the first point of call for most of the mothers, especially those in the rural settings, need to be more equipped to serve the people. The findings of this study highlighted the need for continuous training to correct the healthcare workers' misconceptions in relation to the prevention and control of neonatal sepsis at the grassroots level. In addition, it should be ensured that the healthcare workers put the aseptic techniques into practice for neonatal caring and also teach the mothers to observe aseptic techniques when caring for their newborns.

Limitations of the Study

One of the limitations of the present study is that the majority of the sampled healthcare workers were nurses. Therefore, generalization to other groups of health workers should be done with caution. Future studies may ensure the equal representation of different professional groups of health workers. Future research should also consider the service staff and nurse assistants in the neonatal units of healthcare facilities.

Conclusion

This study investigated the knowledge and current practice of healthcare workers regarding neonatal sepsis prevention and management. The findings were indicative of the healthcare workers' misconceptions regarding neonatal sepsis causes and management. Regarding this, the healthcare workers should be subjected to educational intervention, based on the premise that they are adequately prepared and well informed about the causes, prevention, and management of sepsis, targeted toward addressing these myths and misconceptions. The findings of the present study also indicated the constraints that the healthcare workers face in terms of the availability of facilities that are necessary for the control of neonatal sepsis.

Acknowledgements

The authors appreciate the support of staff of the selected healthcare facilities for their time and cooperation during the study.

Conflicts of interest

The authors declared no conflicts of interest.

References

1. Ayoola OO, Orimadegun AE, Akinsola AK, Osinusi K. A five-year review of childhood mortality at the University College Hospital, Ibadan. West African Journal of Medicine. 2005; 24(2):175-179.
2. United Nations Children's Fund. In the state of the world children. Women and children the double dividend of gender equality. New York: The United Nations Children's Fund; 2007. P. 99-141.
3. Omoigberale AI, Sadoh WE, Nwaneri DU. A 4 year review of neonatal outcome at the University of Benin Teaching Hospital, Benin City. Nigerian Journal of Clinical Practice. 2010; 13(3):321-325
4. Abd El Fattah N, Negawa A, El-Dein Z. Assessment of quality of nursing care provided immediately after birth at university hospital. Life Science Journal. 2012; 9(4):2115-2126.
5. Thaver D, Zaidi AK. Burden of neonatal infections in developing countries: a review of evidences from community based studies. The Pediatric Infectious Disease Journal. 2009; 28(1):S3-S9.
6. Lawoyin T, Onadeko MO, Asekun-Olarinmoye EO. Neonatal mortality and perinatal risk factors in rural South-Western Nigeria: a community based prospective study. West African Journal of Medicine. 2010; 29(1):19-23.
7. Mafullul YM, Ogunlesi OA, Sijuwola OA. Psychiatric aspects of criminal homicide in Nigeria. East African Medical Journal. 2001; 78(1):35-39.
8. Ike Elizabeth U, Modupe OO. Pattern of diseases and care outcomes of neonates admitted in special care baby unit of University College Hospital, Ibadan, Nigeria from 2007 to 2011. Journal of Nursing and Health Science. 2015; l4 (1):62-71.

9. Orimadegun AE, Akinbami FO, Tongo OO, Okereke JO. Comparison of neonates born outside and inside hospitals in a children emergency unit, southwest of Nigeria. Pediatric Emergency Care. 2008; 24(6):354-358.
10. Mullany LC, Darmstardt GL, Tielsch JM. Role of antimicrobial applications to the umbilical cord in neonates to prevent bacteria colonization and infection: a review of the evidence. The Pediatric Infectious Disease Journal. 2003; 22(11):996-1002.
11. Kennedy AM, Elward AM, Fraser VJ. Survey of knowledge, beliefs and practices of neonatal intensive care unit health care workers regarding nosocomial infections, central venous catheter care and hand hygiene. Infection Control & Hospital Epidemiology. 2004; 25(9):747-752.
12. Hanson LA, Korotkova M. The role of breastfeeding in prevention of neonatal infection. Seminars in Neonatology. 2002; 7(4):275-281.
13. Vergnano S, Sharland M, Kazembe P, Mwansambo C, Heath PT. Neonatal sepsis: an international perspective. Archives of Disease in Childhood-Fetal and Neonatal Edition. 2005; 90(3):F220-F224.
14. Bertini G, Dani C, Cianciulli D, Rubaltelli FF, Nicoletti P. A trial of preventing early- and late-onset Group B streptococcal sepsis with combined intrapartum chemoprophylaxis and universal neonatal screening. Journal of Perinatal Medicine. 2006; 34(5):420-424.
15. Darmstadt GL, Bhutta ZA, Cousens S, Adam T, Walker N, de Bernis L. Evidence-based, cost-effective interventions: how many newborn babies can we save? The Lancet. 2005; 365(9463):977-988.
16. Zaidi AK, Ganatra HA, Syed S, Cousens S, Lee AC, Black R, et al. Effect of case management on neonatal mortality due to sepsis and pneumonia. BMC Public Health. 2011; 11(3):S13.
17. National Population Commission. ICF Macro. Nigeria demographic and health survey, 2008. Nigeria National Population Commission; 2009.
18. Araoye MO. Research Methods with statistics for health and social sciences. New York: Nathadex Publishers; 2004. P. 115-121.
19. Ayiasi RM, Criel B, Orach CG, Nabiwemba E, Kolsteren P. Primary healthcare worker knowledge related to prenatal and immediate newborn care: a cross sectional study in Masindi, Uganda. BMC Health Services Research. 2014; 14(1):65.
20. Plotkin M, Tibaijuka G, Makene CL, Currie S, Lacoste M. Quality of care for prevention and management of common maternal and new-born complications: a study of 12 regions in Tanzania. Baltimore: Jhpiego; 2011.
21. Ibrahim YS, Said AR, Hamdy GK. Assessment of infection control practices in a neonatal intensive care unit (NICU). Egyptian Journal of Community Medicine. 2011; 29:27-45.
22. Sessa A, Giuseppi G, Albano L, Angelilo IF. An investigation of Nurses' knowledge, attitudes and practices regarding disinfection procedures in Italy. BMC Infectious Diseases. 2011; 11(1):148.
23. Bebell LM, Muiru AN. Antibiotic use and emerging resistance: how can resource-limited countries turn the tide? Glob Heart. 2014; 9(3):347-358.
24. Levy O. Innate immunity of the newborn: basic mechanisms and clinical correlates. Nature Reviews Immunology. 2007; 7(5):379.
25. Carlbom DJ, Rubenfeld GD. Barriers to implementing protocol-based sepsis resuscitating in the emergency department-results of a national survey. Critical Care Medicine. 2007; 35(11): 2525-2532.
26. Mukhtar-Yola M, IIiyasu Z. A review of neonatal morbidity and mortality in Aminu Kano Teaching Hospital, Northern Nigeria. Tropical Doctor. 2007; 37(3):130-132.
27. Reesha J. Improving neonatal health in Nepal: major challenges to achieving Millennium Development Goal 4. Health Science Journal. 2013; 7(3):247-257.
28. Mbwele B, Ide NL, Mrema JG, Sarah AW, Melnick JA, Manongi R. Learning from health care workers opinions for improving quality of neonatal health care in Kilimanjaro region, North East Tanzania. Annals of Medical and Health Sciences Research. 2014; 4(1):105-144.
29. John B, David M, Mathias L, Elizabeth N. Risk factors and practices contributing to new-born sepsis in rural district of eastern Ugandan, August 2013: a cross-sectional study. BMC Research Notes. 2015; 8(1):339.
30. Thaver D, Zaidi AK. Burden of neonatal infection in developing countries: a review of evidence from community-based studies. The Paediatrics Infectious Disease Journal. 2009; 28(1):S3-S9.