ORIGINAL ARTICLE

Impact of Standard Guidelines on Nurses Knowledge and Practices Regarding the Prevention of Neonatal Sepsis at Public Hospital, Pakistan

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ABSTRACT
Background: Sepsis is one of the most frequently occurring complications that affect newborn infants. For pediatric age group, it serves as a prime base of mortality and morbidity. Objectives of this study are to evaluate the nurses' knowledge and practices regarding the neonatal sepsis and to evaluate the impact of standard guidelines intervention program on nurses' knowledge and practices regarding the prevention of neonatal sepsis.
Methodology: This educational base randomized control trial was the knowledge and practices of the nurses were assessed using questionnaires and checklists distributed among the control group and the intervention group which was made to attend the training sessions. Mean scores of pre- and post-intervention and pre- and post-control groups were analyzed and compared statistically.
Results: Post- intervention category showed the highest mean score of 11.38±2.26 as compared to other three categories. A significant difference (p <0.0001) was observed between the mean scores of pre and post intervention knowledge and practices scores while an insignificant differences as p=0.133 and p=0.111 were observed in mean scores of pre and post control groups of knowledge and practices respectively.
Conclusion: The training session based on the standard guidelines to prevent neonatal sepsis was proved to be an effective intervention to enhance the knowledge of the nurses and their compliance with universal precautions.
Keywords: Standard guidelines, nurses, neonatal sepsis, NICU, knowledge, practices, prevention.

INTRODUCTION
Sepsis is one of the most frequently occurring complications that affect newborn infants. For pediatric age group, it serves as a prime bases of mortality and morbidity and even though there have been many advancements made in the field of neonatal care, the progress of reducing the mortality is still unimpressive.[1] The eighth major cause of mortality among individuals under the age of five years worldwide, remains to be neonatal sepsis worldwide, which accounts for greater than one million deaths on a global scale.[2]

Generally, neonatal sepsis is of three categories based on the time of onset i.e., early onset sepsis (EOS), late onset sepsis (LOS) and very late sepsis that is observed between 29 and 120 days of an infant's age.[3] Among these, late onset sepsis remains the most frequent particularly in infants born with very low birth weight (VLBW).EOS in the newborns is caused by microbes found in the genital tract of the mothers or their delivery area. Comparatively, microbes responsible for the LOS are found thriving in the environment of homes or hospitals and the transmission of infection often occurs through the hands of the care-providers.[4]

As per an evaluation by the World Health Organization (WHO), the annual birthrate of neonates is 130 million of eight million do not make it to their first birthday while >10 million do not survive past the age of five years.[5] Annually, 1.6 million deaths are a result of neonatal infections in the developing countries and the primary cause of mortality in the newborns is infection.[6, 7] Neonatal sepsis has a varied and diverse prevalence in different regions and nations. It ranges from 7.1[8] to 38 [9] in Asia, andin Pakistan its prevalence is 5.6 to 21 deaths per 1000 live births.[10-11]

There is variety of factors to cause neonatal sepsis of which few are linked to mothers, some are environmental, while some of them are individual and congenital. Mostly, maternal factors are responsible for the early sepsis in newborn. [12] Environmental factors such as community or hospital acquired infections are associated with late onset of sepsis among neonates. It was observed that babies admitted in Neonatal Intensive Care units (NICUs) developed late onset of neonatal infection due to the poor precautionary measures of infection control. [13]

The largest proportion of the healthcare workers (HCW) consists of the nurses and are described in a study as the "nucleus of the health care system".[14] Knowledge and practices of nurses' greatly impact the possible prevention and control of the nosocomial infections. [15]

There have been several studies conducted regarding the knowledge, attitude and practices of nurses for the prevention of neonatal sepsis. Some of the studies revealed the inadequate understanding of the concept of SOPs among nurses and put a spotlight on the fact that there is a dire need to address this issue by the introduction of necessary measures for the staff of the hospital so that their knowledge and understanding of practices can be enhanced.[16] Considering scarce focus on the issue in this region, it is absolutely important to investigate and know the impact of standard guidelines on nurses' knowledge, attitudes, and practices regarding the neonatal sepsisso that suitable strategies can be developed and adapted. Therefore this study was undertaken to evaluate the nurses' knowledge and practices regarding the neonatal sepsis and to evaluate the impact of standard guidelines intervention program on nurses' knowledge & practices regarding the prevention of neonatal sepsis.

MATERIAL AND METHODS
This educational base randomizes control trial study was conducted in Neonatal intensive care unit (NICU) of District Headquarter Hospital Muzaffargarh from 27 October 2021 to 27 January 2022. A sample size of 72 (36 in each group) nurses was calculated with 95% confidence interval, 80% power of the test and expected mean knowledge score in group A (Intervention group) as 8.88+1.25 (Pilot study) and in group B (Control group) as 28.67+4.5.[17]All the staff nurses working in NICU, having a job experience of at least six months and consisting of Diploma/BSN/POST RN/BSN/MSN were included in this study. Student nurses, nurses on annual, maternity, study leave and on rotation duty were excluded from this study.

Data was collected using researcher made questionnaire. The questionnaire was divided into three parts. The section A was designed to collect data about socio-demographic data, and it comprised of variables such as, age, qualification, years of experience and, whether the participant have attended any training regarding neonatal sepsis care or not. The section B was designed

to assess the knowledge of nurses regarding neonatal sepsis, and it consisted of 15 items. Each item of knowledge had three multiple choices. The nurse's knowledge score was distributed as described above. [18] The section C was designed to collect data of nurses' practices regarding the prevention of neonatal sepsis. It comprised of 23 items. Each nurse was observed during the actual involvement practices for neonates' care, and the observational checklist was filled by the researcher. All the participants were divided randomly in 2 (experimental and control) group. Each group included 36 participants. The groups were named as group A (Experimental) and group B (Control). Pre-intervention data was collected from experimental and control group regarding knowledge about neonatal sepsis and their actual practices through observation. Areas of weakness in nurses' knowledge and practices were identified. Data was entered and analyzed in SPSS Version 21. Quantitative variables were presented in the form of means ± SD and histogram was made. Qualitative variables were presented in the form of frequency and percentages. Pie chart or bar chart were made. Independent sample t-test was applied to compare the score of knowledge and practices. P value ≤ 0.05 was considered as statistically significant.

RESULTS

A total of 72 (36 in each group) nurses working in NICU from at least 6 months were initially recruited for this study however 2 nurses did not participate in sessions in intervention group and 3 did not found on follow up from control group hence dropped from this study. A total of 34 nurses in intervention group and 33 in control group were included in final analysis. Mean age of nurses was remained to be 38.1±7.4 years. Distribution of different age groups was also explored and most of the nurses (40.2%) were found to be in age group of 31-40 years. Comparison of age groups is presented in Table I.

Table 1: Comparison of Age Groups between Both Groups

Age Groups	Group			
	Intervention		Control	
	n	%	N	%
≤30 Years	7	20.6	5	15.2
31-40 Years	14	41.2	13	39.4
≥41 Years	13	38.2	15	45.4

Level of education was assessed among both groups and not much difference among study subjects of both groups could be noticed. Highest frequency of participating nurses had diploma in general nursing (55.3 %), followed by BSN (32.8%) and MSN (11.9%) respectively as shown in figure 1.

Figure 1: Distribution of Level of Education

8, 11.9%
22, 32.8%
37, 55.3%

- Diploma in GN*
- BSN
- MSN
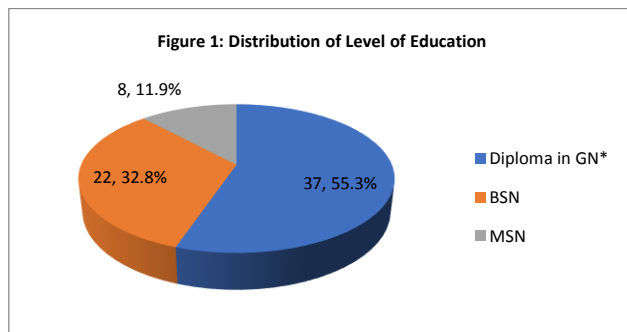
Segregation of level of education revealed that higher age groups had a greater tendency of having diploma in general nursing whereas BSN and MSN were professionals had ages ≤40 years in this study as depicted in Table II. Training regarding neonatal sepsis care was provide to 40/67 (59.7%) nurses comprising 20/34 (58.8%) of intervention group and 20/33 (60.6%) of control group. Rest of the nurses had no prior training of neonatal sepsis care.

Table 2: Distribution of Level of Education in Various Age Groups

Age Groups	Education					
	Diploma in GN		BSN		MSN	
	N	%	n	%	n	%
≤ 30 Years	0	0.0	7	31.8	5	62.5
31-40 Years	9	24.3	15	68.2	3	37.5
≥41 Years	28	75.7	0	0.0	0	0.0

Overall mean score of knowledge for all four categories was remained to be 9.19±2.29 while post- intervention category showed the highest mean score of 11.38±2.26 as compared to other three categories. Two tailed independent sample t-Test showed a significant difference (p <0.0001) among the mean scores of pre and post intervention knowledge scores while and insignificant difference (p=0.133) was observed in mean scores of pre and post control group. Similarly practices of nurses in neonatal care were also assessed and overall mean scores remained to be 14.04±3.53 while post- intervention category has showed a great improvement presented a highest mean score of 18.03±1.98 as compared to other three categories showed in table III. Two tailed independent sample t-Test showed a significant difference (p <0.0001) among the mean scores of pre and post intervention practices scores while and insignificant difference (p=0.111) was observed in mean scores of pre and post control group.

Table 3: Distribution of Mean Knowledge and Practices Scores among Groups

Group	Mean	Standard Deviation	p-value
Knowledge Score of candidates			
Pre-Intervention	8.21	1.74	<0.0001
Post-Intervention	11.38	2.26	
Pre-Control	8.24	1.64	0.133
Post-Control	8.91	1.91	
Practices Score of candidates			
Pre-Intervention	12.32	2.73	<0.0001
Post-Intervention	18.03	1.98	
Pre-Control	12.30	2.63	0.111
Post-Control	13.45	3.13	

Level of knowledge was assessed according to the laid criteria of percent scores and found that only poor and average score was obtained by the candidates of both test and control groups before intervention while good score was not obtained by any candidate in the beginning. After intervention a great change in test group was observed where none get poor scores and 67.6% study subjects secured good scores however 12.1% of the control group also secured good scores later. Similarly level of practices was also assessed according to the laid criteria of percent scores and found that only poor and average score was obtained by the candidates of both intervention and control groups before intervention while good score was not obtained by any candidate of both groups in the beginning as is shown in Table IV.

Table 4: Level of Knowledge among Groups Before and After Intervention

Category	Group							
	Pre-Intervention		Pre-Control		Post-Intervention		Post-Control	
	n	%	n	%	n	%	n	%
Level of Knowledge								
Poor (<50%)	14	41.2	13	39.4	0	0.0	9	27.3
Average (50-75%)	20	58.8	20	60.6	11	32.4	20	60.6
Good (>75%)	0	0.0	0	0.0	23	67.6	4	12.1
Level of Practices								
Poor (<50%)	15	44.1	14	42.4	0	0.0	10	30.3
Average (50-75%)	19	55.9	19	57.6	11	32.4	19	57.6
Good (>75%)	0	0.0	0	0.0	23	67.6	4	12.1

DISCUSSION

Healthcare-associated infection (HAI) is considered to be a problem of public health all around the world. It is mainly responsible for the morbidity and mortality of neonates. As a

consequence, the updated knowledge and practices of the nurses of neonates play a significant role in the control and prevention of HAI in NICU. The effectiveness of the preventive bundle guidelines application for the control of HAI was affirmed by the findings of the study.

Regarding the characteristics of the nurses, the current study reported the finding that almost one out of every three nurses was aged between 30-35 years with their mean age being 38.1±7.4 years. Mean ages of intervention and control group were also found to be similar, the majority of them had diploma in general nursing.Our results also reveal an association of age with the possession of degree.These results were in line with results of shauq et.al, where one third of the nurses were found to be between age 30-39 years, within them a minority attended nursing college while 48.6% of them were nursing diploma holders.[19]

The National Sample Survey for Registered Nurses conducted in 2008 revealed a constant rise in the number of registered nurses having a bachelor's degree in nursing as well as also noted 34% of the registered nurses to have at least a bachelor's degree or higher level in nursing. Nonetheless, it was also noted during the study that majority of the registered nurses having diploma in nursing as to prepare them initially, followed up with their education to acquire at least a baccalaureate or higher-level degrees. A study by Flynn 20 conducted in the State of New Jersey also made note that the commonest pathway towards initial education of nursing was diploma. Akin to the findings reported by National Sample Survey of Registered Nurses conducted in 2008, also revealed that registered nurses having diploma as their initial education, proceeded to obtain further education in form of the highest available college degree.[20]

It is presented by the results of this study that despite the greater number of nurses who have previously attended the neonatal care trainings, we cannot neglect those lesser but significant number of nurses (40.3 %) who did not attend previous training courses. These results were in consensus with results of Who revealed one third portion (34.2%) of the nurses under study to have not received program for training about infection control[21]. Moreover, a study, revealed that around 10% of nurses had previously attended the training courses regarding infection control. [22]. This may be credited to either the lack of interest of nurses or to the discontinuation of the infection control program by the team of the hospital. This finding is acknowledged by in another study that similar to other developing regions, administration of training program related to the control of infection in Egypt encountered problems like scarcity of professional related to healthcare as well as of experts required for the implementation of the programs. [23]

In our study, the post- intervention category has shown a great improvement and the mean score differs significantly (p < 0.0001) from the pre-intervention group whereas, both the control groups had similar mean scores. This was in accordance with the result of a study conducted in India byKoshy and Patel Who made a comparison of total scores based on the knowledge of nurses both pretest and post-test, and reported them to be of high significance. [24]

The nurses' knowledge score revealed that initially, the pre-control and pre-intervention group had poor (< 50 %) to average score (50-75 %) where none scored good (> 75 %) indicating towards the substandard status of the knowledge of nursing staff at the baseline. In united states it is required by all the state boards for nursing that a nurse show a continuing education prior to renewal of their nursing licenses. [25] Opting for such measures impose towards a notion that whether the registered nurses are beginner or experienced in the field, would bear sufficient knowledge with respect to transmission, effective methods required for controlling nosocomial infections spread and etiology.

In our study, the post-intervention group revealed a significantly greater number of nurses (85 %) to have good score of knowledge (> 75 %). Rest of them scored average and none of the nurses of intervention group scored poor after the intervention program. One of the reasons for the improvement in knowledge of neonatal sepsis and its prevention could be the positive impact of clinical training in infection control practices. The clinical training during the 3 months included various teaching strategies, like demonstration, clarification, and open discussion. These can help improve a student's knowledge. Moreover, the findings of this study are congruent with those of the study of Abela and Borg [26], who used the World Health Organization observational method for hand hygiene. The results indicated that illustrated image posters, coupled with an educational lecture in the clinical setting, would help improve an knowledge of and compliance with infection control practices.

The findings of this study demonstrated significant differences in the practice of essential measures required for the prevention of HAIs in neonatal intensive care units both before and after the implementation of guidelines program for the prevention presented by the highest mean score of 18.03±1.98 (p < 0.0001) of post-intervention group.

CONCLUSION
The conclusions drawn by the study demonstrated considerable improvement in the knowledge and practices of the nurses with regard to preventive bundle guidelines application in NICU. The training session based on the standard guidelines to prevent neonatal sepsis was proved to be an effective intervention to enhance the knowledge of the nurses and their compliance with universal precautions which can help in the future to reduce the incidence of neonatal sepsis and the mortality rates associated with it.

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