Original Article

Effect of Educational Intervention on Neonatal Nurses Practices Regarding Oral Motor Stimulation on Early Transition from Tube to Oral Feeding in Preterm Infants

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ARTICLE INFO

ABSTRACT

Nurses working in neonatal nursery units play a crucial role in assessing the preterm infants feeding readiness cues for initiation of oral feeding and implementing the evidence-based intervention to support the development of feeding skills. **Objectives:** To assess the effect of educational intervention on neonatal nurses' practices regarding oral Motor stimulation on early transition from to oral oral feeding in preterm infants. **Methods:** A quasi-experimental single group study conducted in Children Hospital Lahore from May to July 2023. Pre and post intervention data was collected through the observational checklist from 36 nurses working in Neonatology. Nurses were educated through PowerPoint presentation and direct demonstration on infants. **Results:** Descriptive statistics showed that Majority of nurses were having diploma in nursing, 4-10 years' experience and belonged to 31-45 years age category. In inferential statistics Paired sample t-test revealed that the majority of nurses (100%, n=36) had incompetent practices before training which were improved (91.6%, n=33) after educational intervention with significant p-value<0.05. **Conclusions:** The nurses who received training revealed competent practices so we conclude that educational intervention was effective to improve the nurses' practices.

INTRODUCTION

In low middle income countries (LMIC), approximately 40 to 70 % preterm infants experienced feeding difficulties, about 500000 preterm infants diagnosed with difficulty in sucking and swallowing annually and this rate was increasing nationally [1, 2]. Moreover, 20 to 80% preterm infants who were discharge from intensive care unit still experience difficulty in feeding [3]. One of the discharge criteria of preterm infants from neonatal nursery unit is successful independent oral feeding [4]. Neurological and physiological maturity as well as coordination between oral motor functions are essential for preterm infants to feed independently [5]. However, immaturity of these functions causes the delayed initiation of oral feeding. Until the maturation of organs and their functions preterm infants get feeding by enteral (nasogastric/ orogastric) and parenteral routes [6]. Immature feeding skills are the cause of longer hospital stay [7]. Nurses working in neonatal nursery units play a crucial role in assessing the preterm infants feeding readiness cues for initiation of oral feeding and implementing the evidence-based intervention to support the development of feeding skills [8]. Evidence based interventions are feeding positions that must be semi elevated or side lying [9]. Oromotor stimulation exercises nonnutritive sucking that facilitates the development of oral motor functions for successful initiation of oral feeding [9-11]. Many researches have been

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conducted to assess the preterm infants feeding skills [12]. Factors effecting the development of feeding skills effect of evidence-based interventions on the development of oral feeding skills [13, 14]. Very few studies have been conducted to assess the neonatal nurse's knowledge on implementing the evidence- based interventions and evaluating the preterm infants feeding readiness cues for successful transitioning to oral feeding [15]. According to a study nurse working in neonatal nursery units need knowledge about proper positioning of preterm infants while feeding, nonnutritive sucking, feeding readiness, cue based feeding and oral stimulation exercises [16]. Nurses training about evidence-based nursing interventions that include oral motor stimulation and nonnutritive helps the preterm infants feeding skills development and early transition to oral feeding [17]. It is difficult for nurses working in neonatology department to identify the ideal moment for switching tube feeding to oral feeding in preterm infants. Several characteristics determines whether the premature infant is ready for oral feeding trails or not [18]. These characteristics of oral feeding readiness are Physiological stability including Heart rate, oxygen saturation, temperature, respiratory rate and skin color, Neuro-behavioral maturity including maintaining flexed body posture, being awake and alert, crying for feed and demonstrating the suck- swallow breathing coordination [19-23]. One of the most important elements to assess the infant readiness for oral feeding trails is the trophic feeding tolerance and age of infant that is calculated by mothers last menstrual period [24].

No study has been conducted yet on neonatal nurses training to improve their practices. Improving nurses' practices about the oral stimulation exercise and feeding readiness cues is crucial for safe and successful initiation of oral feeding and to prevent its negative effects on infants and their parents.

METHODS

Single group (pre, post) quasi-experimental study design was used to evaluate the effect of educational intervention about oral stimulation exercise and feeding skills assessment for successful initiation of oral feeding in preterm infants. Study was conducted between May to July 2023 in neonatal nursery unit of Children's Hospital Lahore. Sample size was calculated to be 36 by using total population for small sample size formula

$n = Nz^2pq/(E^2(N-1)+z^2pq)$

where, N=37; z (confidence level) =1.96; E (+ - error) = 0.03; p= 0.5; q=0.5

Total 36 nurses working in neonatal nursery unit of children hospital with at least 6 months experience were included in study by using purposive sampling technique. Nurses who

attended a workshop or training on oral stimulation exercise during last six months were excluded from the study. Nurses received education about Oral motor stimulation application and early feeding skill assessment through power point presentation and direct demonstration on patients during their regular working hours in the class room of Neonatology Unit. Morning staff received training at morning shift and evening staff at evening shift separately. Each training class consisted of 6 nurses and total six classes were conducted for two shifts (6+6,6+6,6+6). Each training class duration was 45 minutes. A form was given the participants including 3 questions about their age, neonatal intensive care experience, and educational level. Observational checklist on neonatal nurses' practices was adopted with "done", "not done" that include 3 main themes and 19 sub points. A pilot study was done on 10% sample for clarity of tool Reliability was checked by Cronbach alpha 0.86. Validity of tool was done by the jury of five experts of neonates. Total 19 items were included under the three main themes, early feeding readiness, engagement in feeding and physiological stability. Researcher marked the responses done (1) not done (0). Scores was categorized >15 or >80% competent and <15 or <80% incompetent. This study was completed in three phases: Pre-Intervention Phase: This phase was started after receiving ethical approval for the study from University of Lahore (Letter No: REC-UOL-425-06-2023) that was issued on dated: June 19th ,2023. An observational checklist was used to assess the nurses' practices about oral motor stimulation, early feeding skills assessment for transitioning to oral feeding by the researcher. The time allocated for this phase was 1 month, as established by the researcher. In intervention phase educational intervention was provided to the nurses. The time allocated for this phase was 2 months in which nurses received 45 min lecture over oral motor stimulation application and early feeding skills assessment. In Post Intervention phase, Researcher re-assessed the nurses' practices about oral motor stimulation in preterm infants for transition to oral feeding by using the observational checklist and allow nurses to be practised on 2-3 neonates while being watched, and if improvements were required the researcher guided them. In statistical analysis SPSS version 25.0 was used to analysed the data. Data were analyzed using descriptive and inferential statistics. Descriptive analysis was used to check the frequency of demographics variable of nurse's practices pre and post intervention. Whereas, inferential analysis (paired sample t-test) was done for the comparison of Pre, post data of nurse's practices.

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RESULTS

Table 1 shows the demographics characteristics of nurses working in neonatal care unit results reveled that nurses age between 31-45 were greater in number (16, 44.4%,) as compare to the age group 26-30 (05, 13.8%). In Nurses level of education, Diploma nurses were greater in number (13, 36.11%), when compare to Generic BScN (2, 5.56%) and Specialization diploma (10, 27.78). Nurses neonatal care experience results reveled that majority of nurses were having 4-10 years' experience (16, 44.44%) as compare to the 1-3 years' experience (10, 27.78%) and 11-25 years' experience (10, 27.78%) respectively.

Table 1: Demographic Characteristics of Nurses Working in Neonatal Unit

Demographic Variables	Category	n (%)
Nurses' Age	22-25	15 (41.6)
	26-30	05 (13.8)
	31-45	16 (44.4)
Education Level	Diploma	13 (36.11)
	Generic BScN	02 (5.56)
	Specialization	10 (27.78)
	Post Rn	11 (30.5)
Neonatal Care Experience	1-3 Years	10 (27.78)
	4-10 Years	16 (44.44)
	11-25 Years	10 (27.78)

Descriptive Statistics analyzed by frequency 'n' and percentage '%'

Results revealed that the majority of nurses (100%, n=36) had incompetent practices before training which were decreased in number after educational intervention (3, 8.3%) and (0, 0%) nurses had competent practices before training which were improved and revealed significant change (33, 91.6%) after educational intervention (table 2).

Table 2: Comparison of Pre and Post Training Competency in Practices

Demographic Variables	Pre-Training	Post-Training	p-value
	n (%)	n (%)	
Incompetent Score	36 (100)	3 (8.3)	0.002
Competent Score	0 (0)	33 (91.6)	

Dependent Sample t-test, Exact. Sig. (2-tailed) p<0.05

Paired sample t-test, a parametric test, was applied for the variable of Nurses Practices to compare pretest and posttest scores. Results revealed the significant improvement in practices scores. Pretest mean scores of checking body in flexed position was 5.83 ± 0.62 that was improved 16.09 ± 0.42 after educational intervention, checking awake state Pretest mean scores were 12.09 ± 2.6 that improved after educational intervention, 20.32 ± 1.87. Similarly, Checking Energy for feed pre intervention scores were 10.36 ± 2.83 that improved to 16.78 ± 2.19 with p-value 0.000. Checking Baseline Oxygen saturation >93%e pre intervention mean scores 10.36 ± 2.83 and after intervention mean scores 34.77 ± 4.01, Checking Behavior stress cues during feeding pretest scores 4.85 ± 0.54 post-test scores 15.34 ± 0.62 Doing nonnutritive sucking pre intervention scores 10.09 ± 2.6 that improved after intervention 20.32 ± 1.87, Doing stimulation of lateral boarder of Tongue pre intervention scores12.09 ± 2.6 that improved after intervention 14.32 ± 1.87. Doing cheek stretching in C-shape pattern pretest mean scores 10.36 ± 2.83 that was improved after educational intervention 34.77 ± 4.01 with p-value 0.000. P-value <0.05 was taken as significant (table 3).

Table 3: Comparison of Pre- and Post-Training Practices

Training Practices	Pre-Training	Post-Training	p-value
	Mean ± SD	Mean ± SD	
Checking Body in a Flexed Position	5.83 ± 0.62	16.09 ± 0.42	0.000
Checking Awake State	12.09 ± 2.6	20.32 ± 1.87	0.000
Checking Energy for Feed	10.36 ± 2.83	16.78 ± 2.19	0.000
Checking Baseline Oxygen Saturation	10.36 ± 2.83	34.77 ± 4.01	0.000
Checking Behavioral Stress Cues During Feeding	4.85 ± 0.54	15.34 ± 0.62	0.000
Doing Nonnutritive Sucking	10.09 ± 2.6	20.32 ± 1.87	0.000
Doing Stimulation of Lateral Boarder of Tongue	12.09 ± 2.6	14.32 ± 1.87	0.000
Doing Cheek Stretching in C Shape Pattern	10.36 ± 2.83	34.77± 4.01	0.000

Dependent sample t-test, Exact. Sig. (2tailed) P<0.05

Paired sample t-test revealed the significant improvement in practices scores, pre intervention scores 7.0000 ± 1.74895, that was improved after educational intervention 16.3333 ± 1.02899 with p< 0.001. P-value <0.05 was taken as significant (table 4).

Table 4: Paired Sample T-Test for Comparison of Nurses Practices Before and After the Training

Nurses Practices	Pre-Training	Post-Training	p-value
	Mean ± SD	Mean ± SD	
	7.0000 ± 1.74895	16.3333 ± 1.02899	< 0.001

Dependent sample t-test, Exact. Sig. (2tailed) p<0.05

DISCUSSION

Nurses working in neonatal nursery department require sufficient knowledge and competent practices for supporting preterm infants to initiate their successful independent oral feeding [8]. In many years importance has been given to improve nurses' skills [12]. In this study we evaluate the effect of educational intervention on nurses' practices for successful initiation of oral feeding in

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preterm infants before and after the educational intervention, 3 months after the training significant improvement was observed in nurses' practices scores and suggest that training was effective in improving the nurses' practices. In present study we evaluated nurses' practices about oromotor stimulation for transition to oral feeding in preterm infants before and after training program on this topic, our finding showed a significant improvement in scores two months after the training when compared the scores before the training, hence we conclude that training was effective and it improved the nurses' practices. Similarly, a study performed by Pratiwi *et al.*, was conducted on Turkish neonatal nurses, study finding showed that before the training nurses had insufficient knowledge and incompetent practices (0-7.6%) about oral motor stimulation, cue-based feeding, semi-elevated or side lying positioning during feeding, slow flow nipples usage that was improved after training (20.5- 77%)[8]. The demographic data of studied nurses (Table 1) in present study showed that almost half of the nurses (41.6%) belonged to the age group of 22-25 years, these findings similar to another study by Kritzinger et al., according to the study results, almost 45% nurses belonged to the age group of 20-30 [3]. Pratiwi *et al.*, supported this, revealing that about 60% nurses belonged to the 20-30 years age group [8]. According to the researcher point of view at this age group nurses are more energetic skilled and because of increasing number of graduates at this age group from nursing institutes. Nurses level of education (Table 1) the present study findings showed that 5.56% nurses were having BScN degree. This finding was in contrary with Pratiwi *et al.*, according to study findings more than half (90,75%) of the nurses were having BScN degree holder [8]. Mohamed Arafa *et al.*, study results showed (96,80%) nurses were having BScN degree [25]. According to the researcher point of view, BScN degree program for nurses was started in 2018 this is reason behind the limited number of Generic BScN in NNU and to provide the better nursing care to preterm infants the neonatal care nurses should be university graduates. Regarding to the years of experience (Table 1) in Neonatal nursery unit, the present study findings showed that, 27.78% nurses were having 1-3 years' experience in neonatal care unit. These results were in oppose with Pratiwi *et al.*, the study revealed that about 45% nurses had 1-3 years' experience in neonatal care unit [8]. A study by Abo El Magd Fathi *et al.*, showed 45% nurses were having 1-3 years of NNU experience. According to the researcher it could be the subject characteristics difference in study. The Pretest mean scores of nurse's practices about oral motor stimulation and transition to oral feeding were (7.2778) and post-test mean scores were (16.333) that were statistically significant and higher than

pretest scores (p value< 0.001). The present study findings show the changes in the statement of incompetent score to competent scores of neonatal nurses in pretest and post-test about oral motor stimulation and transition to oral feeding in preterm infants. Similarly, a study Beissel *et al.*, finding showed that before the training nurses had insufficient knowledge and incompetent practices (0-7, 6%) about oral motor stimulation, cue-based feeding, semi-elevated or side lying positioning during feeding, slow flow nipples usage that was improved after training (20.5, 77%) with a (p-value (<0.05)[4]. Another study by Pratiwi *et al.*, results showed before training nurses practices scores (6.234, 10%)were that was improved (20.2, 89%) after training with statistically significant difference with a (p value <0.05) [8]. A study by Moon *et al.*, assessed the knowledge and practices of Turkish nurses working in neonatal nursery unit about evidence-based intervention, feeding readiness cues, feeding position semi- elevated or side lying, nipple flow of milk [15]. In present study nurses' practices score was lower when compared to the study because the present study was conducted with small sample size and in a single setting. In feeding readiness cue-based feeding, amount and duration of feeding determined by the physiological and behavioral cues of feeding[10]. In the traditionall feeding method, Initiation of oral feeding depends on the gestational age of infants, duration of feeding and volume of milk (mother milk/ formula) determined the successful transition to independent oral feeding [12]. In traditional method nurses support the infants to finish their prescribed feeding amount by pushing and moving the nipple in mouth this intervention hindered the development of suck swallow and breathing coordination in infants [6]. In opposition, in feeding readiness cue-based feeding when to start and stop the feeding depends on the hunger sign and behavioural stress cues. Cue based feeding facilitates the development of feeding skills and early initiation of successful independent oral feed . Oral motor stimulation exercise as an evidence-based intervention is a stimulation exercise of cheeks lips gums tongue and palate given to preterm infants in order to enhance their feeding skills and facilitate the development of suck swallowing breathing coordination for successful initiation of independent oral feeding during enteral and parenteral feeding [5]. In order to implement evidence-based intervention on preterm infants in some countries, proper training is provided to health care professionals, moreover in developed countries occupational therapist are allowed to implement this stimulation exercise in order to facilitate preterm infants early transition to successful oral feeding [9]. In Pakistan we do not have sufficient occupational therapists, so training is provided to the nurses working in

neonateology department so that they implement the intervention safely and effectively with minimum adverse effect that could happen with untrained personals. 36 nurses (100%) were not performing the oral stimulation exercise on preterm infants before the training. After two months after 33 nurses (91.6%) were performing the oral stimulation exercise still 6 nurses (16%) were not implementing the all steps of oral stimulation exercise. Nurses 4(11.1%) were not performing the lip stimulation exercise and 2 of nurses (5.5%) were not performing the lateral boarder of tongue massage.   A study performed by Pratiwi *et al.,* revealed that about (15%) nurses were implementing evidence based oral stimulation intervention before training and after training more than half of the nurses (88%) started practicing oral stimulation intervention [8]. Similarly, study by Abo El Magd Fathi *et al.,* showed 95% nurses practices improved after training [26]. According to the literature preterm infants neurological and physiological maturity increase with age their suck swallow breathing coordination their feeding performance duration of awake time increase [6]. In opposition of literature in present study before training 32 nurses (88.8%) were not evaluating the suck swallow breathing coordination before and during feeding, two months after training 30 nurses (83%) started evaluating the suck swallow breathing coordination but still 06 nurses (16.6%) were not assessed evaluating suck swallow breathing coordination. Difference in present study with literature was because of small sample size and single centre study. In present study no significant difference were found in nurses age and work experience of neonatology department on their practices before and after training. Still in nurses age between 22-25with 1–3-year experience of NNU improvement of practices were observed two months after the training. This is probably because in this age group nurses are mostly newly graduated and ready to learn something new and improve their practices. A significant difference is seen in the practices of nurses who had higher education than the nurses who had only diploma.

CONCLUSIONS

The study findings present a comprehensive analysis of nurse's practices before and after training. It is concluded that training was effective in improvement of nurse's professional practices for assessing the independent oral feeding skills of preterm infants.

Authors Contribution

Conceptualization: MA, MM
Methodology: SN
Formal analysis: SN
Writing-review and editing: SN, MA, MM

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

Source of Funding

All authors have read and agreed to the published version of the manuscript.

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