EFFECT OF GUIDELINES ABOUT ENTERAL FEEDING FOR PRETERM INFANTS ON NURSES' KNOWLEDGE AND PRACTICES

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Abstract

Background: Administration of enteral feeding has long been considered the standard of care for nutritional support in neonatal intensive care units. Good nutritional support is a primary nursing role, therefore, nurses should have adequate knowledge and practice for caring for preterm infants with enteral feeding **Aim**: to evaluate the effect of guidelines about enteral feeding for preterm infants on nurses' knowledge and practices. **Methods**: A quasi-experimental design was utilized at two neonatal intensive care units of El Manial University Hospital (Kaser Al Aini) and Cairo University Children's Hospital (El Monira) from December 2024 to May 2025. A convenient sample of fifty bedside nurses working at both previous settings was included using two tools: Structured questionnaire and observational checklist regarding enteral feeding for preterm infants. **Results**: The study revealed that nurses' level and total mean scores knowledge and practice of enteral feeding significantly improved after intervention at immediate post and follow up compared to pre intervention phase. There was a strong positive correlation between nurses' knowledge and their practices regarding enteral feeding. No correlations were detected between nurses' knowledge or practice and their personal characteristics across all study phases except for age and their qualification. **Conclusion**: The implemented guidelines about enteral feeding for pre-term infants had a significant positive impact on nurses' knowledge and practices at post and follow up intervention, in which nurses who received guidelines had higher mean post- test scores of knowledge and practices compared to pretest. **Recommendation:** All bedside nurses who work at neonatal intensive care units should be educated and trained periodically about safe administration of enteral feeding.

Keywords: Guidelines, Enteral Feeding, Preterm Infants, Nurses' Knowledge and Practices.

1. INTRODUCTION

Administration of enteral feeding (EF) has long been considered the standard of care for nutritional support in neonatal intensive care units (NICUs). Good nutritional support is a primary nursing role; therefore, nurses should have adequate knowledge and practice for caring for preterm infants with enteral feeding. Early initiation of EF is recommended in international guidelines to improve nutrition associated with decreased mortality, improve clinical outcomes, reduce gastric intolerance, promote early reestablishment of gastroduodenal motility, support gut integrity, increase immune function, and lower the risk of infections from parenteral nutrition [1]. Proper placement of the EF tube is crucial because poorly placed tubes (such as those in the esophagus, trachea, duodenum, or at the height of the lower esophageal sphincter) can lead to major complications like bradycardia with cyanosis, aspiration, puncture of the trachea, lungs, or stomach,

pneumonia, malabsorption, or even death [2].Enteral tube feeding includes nasogastric feeding, nasoduodenal feeding, gastrostomy, and jejunostomy. Nasogastric tube (NGT) is usually the primary route for enteral feeding [1].

Ensuring proper nutrition is a fundamental aspect of pediatric healthcare, particularly for infants who are unable to feed orally due to prematurity, neurological impairment, or critical illness. Nasogastric tube placement is one of the most performed procedures in neonatal care, providing a safe and effective method for enteral feeding when oral intake is not possible [3]. However, despite being a routine intervention, incorrect NGT placement poses serious risks, including aspiration pneumonia, feeding intolerance, and, in severe cases, life-threatening misplacement into the respiratory tract. These complications underscore the critical need for ensuring that neonatal nurses have the proper knowledge and skills to perform NGT feeding safely and accurately. Verification of correct tube placement remains a major challenge in clinical practice. Studies have highlighted inconsistencies in the use of verification methods, with some nurses relying on outdated techniques such as auscultation, which lacks accuracy and reliability [4].

International guidelines, including those from The British Association for Parenteral and Enteral Nutrition (BAPEN) and The American Society for Parenteral and Enteral Nutrition (ASPEN), advocate for standardized protocols to reduce the risk of misplacement and complications [4]. However, adherence to these guidelines varies across healthcare settings, leading to ongoing concerns about patient safety. While previous research has explored the role of education and competency-based training in improving EF management, there remains a gap in structured training programs specifically designed for neonatal nurses. Many available interventions are general or tailored to adult care, leaving a lack of targeted educational frameworks that address the unique challenges of neonatal NGT placement and verification [5].

Nursing practice is enhanced when nurses have an adequate understanding of the concepts involved in nursing skills [6]. A previous study conducted by [1] in Iraq to evaluate nurses' practices regarding enteral feeding tubes for preterm infants showed that nurses in the NICU have a moderate to low degree of practice and recommended paying more attention to nurses' practices, particularly those who have recently been employed, and conducting continuous training programs to broaden nurses' foundations of knowledge. [6] reported that approximately two-thirds of nurses had inadequate knowledge regarding enteral feeding of preterm infants. [7] noticed that most of nurses had poor knowledge regarding enteral feeding.

Given the complexity and risks associated with EF management, developing a structured, evidence-based training program for neonatal nurses is essential to ensure safe and effective care. Several studies show that structured educational programs enhance nurses' competence in enteral feeding management. [8] concluded that competency-based training, simulation exercises, and refresher courses improve procedural skills, decision-making, and safety protocol adherence. Formal training for nurses increases confidence, reduces errors, and increases compliance with recommended verification methods [5]. [9] found that hospitals implemented structured NGT training programs

reported a 30% decrease in misplacement-related incidents and highlighting the significance of education in improving patient safety outcomes.

2. METHODS

2.1 Aim

To evaluate the effect of guidelines about enteral feeding for preterm infants on nurses' knowledge and practices.

To achieve the aim of the current study the following research hypotheses were postulated:

H1. Nurses who receive guidelines will have higher mean post- test scores of enteral feeding knowledge compared to pretest.

H2. Nurses who receive guidelines will have higher mean post- test scores of enteral feeding practices compared to pretest.

2.2 Design

A quasi-experimental (one-group pre/post-test) research design was utilized in the current study.

2.3 Setting

The current study was conducted in two NICUs of El Manial University Hospital (Kaser Al-Ainy) and Cairo University Children's Hospital (El Monira). Each unit has a capacity of 64 incubators and is well equipped to provide care for high-risk neonates from all over Egypt. Both NICUs follow the same medical care protocols.

2.4 Participants

A convenience sample of 50 bedside nurses (30 from El Monira Hospital and 20 from Kaser Al-Aini Hospital) who are working in both previously mentioned NICUs and responsible for providing direct care to preterm infants. Nurses of all ages were included, regardless of their educational level, years of experience, or gender. Undergraduate nursing students who were under training in both NICUs were excluded from the study.

2.5 Data Collection Tools

Two tools were used:

Tool I: A structured interview questionnaire:

This tool was designed in Arabic Language by research investigators following a review of relevant literature. It consists of two parts:

Part 1: Personal characteristics of nurses that include age, gender, years of experience in Pediatric nursing practice, years of experience in the NICU and attending previous programs regarding enteral feeding.

Part 2: Nurses' knowledge regarding enteral feeding of preterm infants, that consists of 29 multiple-choice and true or false questions: 7 about definition, causes, complications and nursing care and 22 about definition, indications, advantages, types, methods, contraindications, complications, role of nurse before, during and after enteral feeding and symptoms of feeding intolerance.

Scoring system of nurses' knowledge:

The scoring system for knowledge was guided by a recent Egyptian study carried out by [10], for evaluating the nurses' knowledge. Correct answer had score one and zero for incorrect. The total knowledge score is 29 and it categorized as the following:

- Satisfactory knowledge level: ≥ 60% = ≥17.4 scores.
- Unsatisfactory knowledge level: <60% = < 17.4 scores.

Tool II: An observation checklist of nasogastric or orogastric tube insertion and

administration of enteral feeding by gravity:

This tool was adapted from [11], to assess nursing practice regarding enteral feeding for pre-term infants. It includes 26 steps: 11 for insertion and 15 for feeding administration.

Scoring system of nurses' practice:

The scoring system for practice was guided by a recent Egyptian study carried out by [10], for evaluating the nurses' practices. Score one for correctly done step and zero for incorrectly done or not done. The total practice score is 26 and it categorized as the following: -

- Satisfactory practice level: ≥ 70% = ≥ 18.2 scores.
- Unsatisfactory practice level: <70% = < 18.2 scores.

Enteral feeding guidelines:

It was developed by research investigators after extensive reviewing of the recent related literature about enteral feeding. It included knowledge about pre-term infant definition, causes, complications, nursing care, definition of enteral feeding, types, purpose, advantages, indications, contraindications, methods, nursing care before, during and after enteral feeding, symptoms of feeding intolerance in preterm infants, complications, steps of nasogastric/orogastric feeding tube insertion and administrating feeding by gravity.

Validity and reliability

Tools were given to a panel of three experts in high-risk neonates and pediatric nursing to examine the content validity. Reliability of tool I (part 2) and tool II performed to confirm its consistency using Cronbach's alpha coefficient test to ensure their reliability, it was 94.3 % and 97.1% respectively.

2.6 Procedure

The study conducted through three phases: preparatory and assessment, implementation and evaluation phase.

Preparatory and assessment phase:

Before conducting the current study, the research investigators extensively reviewed related materials, recent medical textbooks, relevant literature and studies to construct the study tools. The guidelines were developed and supported by an illustrated Arabic booklet. Official permission was obtained from the director of Cairo University hospitals. The research investigators met with the head nurses of both units and explained the aim of the study. Subsequently, they introduced themselves to the nurses and provided a simple explanation of the nature of the study and its benefits for both the nurses and pre-term infants. During this phase, nurses were interviewed either individually or in groups of three to five, depending on their availability and the nature of their work conditions in NICUs. The interviews were conducted in nurses' room of El Manial University Hospital (Kasr Al-Ainy) and in the educational room inside the NICU on the third floor of El Monira Hospital.

Assessment of the nurses' knowledge through self-administrated questionnaire (tool I) was obtained and it took about 20-30 minutes, and assessment of the nurses' practices was done by the research investigators using observational checklist (Tool II) that took about 10 minutes for each nurse during their actual work. The data was collected on the day shift for four days per week.

Implementation Phase:

The guideline was prepared by the researchers according to nurses' needs and deficiencies in their performance. The teaching materials including interactive sessions, group discussions, guiding soft and hard booklets with colored pictures, and PowerPoint presentations, simbad manikin, gavage feeding tube size 8 Fr, stethoscope, prescribed formula, non-allergic tape, sterile water for lubrication and flush, 5ml – 10ml syringes, non-sterile gloves, wash cloth and sterile gauze. The guidelines were provided through two sessions, one for theoretical part and one for practical part. The first session focused on theory, providing participants with scientific and theoretical information about enteral feeding for pre-term infants. It took about 30-45 minutes. The second session was focused on practice through demonstration and redemonstration. Demonstration was done by the research investigators using simbad manikin of preterm infant, it took about 10 minutes. Redemonstration was done by each nurse individually and it took about 5-10 minutes. Data collection was conducted on four consecutive days per week in the day shift (from 8am: 7pm) for six months between December 2024 and May 2025.

Evaluation phase:

After completing both guidelines' parts, the nurses underwent an immediate and follow up (after one month) post- test using the same questionnaire and the same observational checklist.

2.7 Statistical Analysis

The data analyzed with SPSS statistical software version 20. Descriptive statistics used to present data as frequencies and percentages for qualitative variables, and means, standard deviations for quantitative ones. The internal consistency approach used to assess the reliability of the tools, with the estimation of Guttman split-half coefficient. Analytic statistics included chi-square tests for comparing categorical variables. Quantitative continuous data were compared using the non-parametric ANOVA tests. Spearman's rank correlation used to assess the relations among quantitative and ranked variables. Multiple regression analysis is used to identify independent predictors of the scores of knowledge and practice. The level of statistical significance was set at p-value <0.05.

3. RESULTS

3.1 Description of Participants

Table (1) presents the distribution of nurses' characteristics. The study included 50 nurses working in neonatal intensive care settings. Females constituted the majority of the sample (60%), while males represented 40%. Regarding age, more than half of the nurses (60%) were aged 25 years or older, with mean age of 27.8 ± 1.0 years.

In terms of educational qualification, nearly three-quarters of the nurses (74%) held a bachelor's degree or higher, whereas 26% had a diploma degree. Concerning professional experience, the majority of nurses (70%) had less than five years of experience in pediatric nursing, while only 30% had five years or more. With respect to experience in the neonatal intensive care unit (NICU), 56% of nurses reported one year or more of experience, compared to 44% who had less than one year.

Regarding training in enteral feeding, most nurses (86%) did not attend any training courses related to enteral feeding, while only 14% reported receiving training. Among those who attended training, 8% participated in one program, 2% attended two programs, and 4% attended three programs, reflecting limited exposure to formal enteral feeding education.

3.2 Tests of Hypotheses

Table (2) illustrates the distribution of nurses' satisfactory knowledge levels (≥60%) regarding preterm infants and enteral feeding throughout the study phases (pre-intervention, immediate post-intervention, and follow-up).

Before the intervention, nurses demonstrated moderate to low levels of satisfactory knowledge across most domains. Satisfactory knowledge regarding the definition and causes of preterm birth was observed in 50% of nurses, while knowledge of complications and nursing care was reported in 52% and 36%, respectively. Following the intervention, all nurses (100%) achieved satisfactory knowledge levels across all preterm-related domains, with a slight decline at follow-up; however, the levels remained high (ranging

from 84% to 96%). These improvements were statistically significant in both pre-post and pre-follow-up comparisons (p < 0.001).

Regarding enteral feeding knowledge, the pre-intervention phase revealed notably low satisfactory levels, particularly for definition, types, and methods (22%) and advantages and complications (34%). After the intervention, all nurses (100%) demonstrated satisfactory knowledge across all enteral feeding domains. At follow-up, knowledge retention remained high (90%–100%). All observed improvements were statistically significant (p < 0.001). Overall, total satisfactory knowledge of preterm care and enteral feeding increased markedly from 44% in the pre-intervention phase to 100% in both the immediate post-intervention and follow-up phases, with highly statistically significant differences (p < 0.001).

Table (3) shows nurses' satisfactory practice levels (≥70%) related to enteral feeding across the study phases. Prior to the intervention, none of the nurses demonstrated satisfactory practice levels in enteral feeding tube insertion or administration of enteral feeding (0%). Immediately after the intervention, all nurses (100%) achieved satisfactory practice levels in both procedures, and this improvement was sustained at the follow-up phase (100%). The differences between pre-intervention and both post-intervention and follow-up phases were highly statistically significant (p < 0.001).

Table (4) compares nurses' total mean scores of knowledge and practice across the three study phases. The mean raw knowledge score increased significantly from 16.3 ± 4.0 in the pre-intervention phase to 28.6 ± 0.7 immediately post-intervention, with a slight decline to 27.0 ± 1.6 at follow-up. Similarly, standardized knowledge scores increased from 56.1 ± 13.9 to 98.6 ± 2.4 post-intervention and remained high at follow-up (93.1 ± 5.6). These differences were statistically significant (p < 0.001).

Regarding practice, the mean raw score improved markedly from 9.6 ± 1.9 pre-intervention to 25.6 ± 0.6 post-intervention, with a minor reduction at follow-up (24.3 ± 1.1). Standardized practice scores showed a similar pattern, increasing from 36.9 ± 7.3 to 98.6 ± 2.4 and remaining high at follow-up (93.6 ± 4.1). All differences were statistically significant (p < 0.001).

Table (5) demonstrates the correlation between nurses' knowledge and practice scores and their characteristics across study phases. In the pre-intervention phase, there was no significant correlation between knowledge and practice scores (r = −0.07, p = 0.609). However, a strong positive correlation was observed in both the post-intervention (r = 0.97, p = 0.001) and follow-up phases (r = 0.97, p = 0.001), indicating that improvements in knowledge were strongly associated with improved practice after the intervention. Age showed a weak negative correlation with knowledge in the pre-intervention phase (r = −0.29, p = 0.039), while qualification demonstrated a weak positive correlation with knowledge (r = 0.30, p = 0.037). No significant correlations were observed between knowledge or practice and years of experience across post-intervention and follow-up phases.

Table (1): Distribution of nurses' characteristics (n=50)

Nurses' Characteristics	No.	%
Gender:		
Female	30	60
Male	20	40
Age:		
<25	20	40
25+	30	60
Mean ±SD	27.8±1.0	
Nursing qualification:		
Diplomas	13	26
Bachelor/higher	37	74
Experience years in pediatric nursing:		
<5	35	70
5+	15	30
Experience years in NICU:		
<1	22	44
1+	28	56
Training programs in enteral feeding:		
No	43	86
Yes	7	14
No. of training programs:		
1	4	8
2	1	2
3	2	4

Table (2): Distribution of nurses' satisfactory level of pre-term and enteral feeding knowledge throughout study phases (n=50)

Satisfactory (60%+) knowledge level of:	Study phases						P	P
	Pre		IP		FU			
	No.	%	No.	%	No.	%	Pre-post	Pre-FU
Pre-term: Definition & causes	25	50.0	50	100.0	48	96.0	<0.001*	<0.001*
Complications	26	52.0	45	90.0	42	84.0	<0.001*	<0.001*
Nursing care	18	36.0	46	90.0	47	94.0	<0.001*	<0.001*
Total:	32	64.0	50	100.0	50	100.0	<0.001*	<0.001*
Enteral feeding: Definition, types & methods	11	22.0	50	100.0	48	96.0	<0.001*	<0.001*
Indications, Contraindications & Intolerance symptoms	38	76.0	50	100.0	49	98.0	<0.001*	0.001*
Advantages & Complications	17	34.0	50	100.0	45	90.0	<0.001*	<0.001*
Nursing care	23	46.0	50	100.0	50	100.0	<0.001*	<0.001*
Total:	16	32.0	50	100.0	50	100.0	<0.001*	<0.001*
Total knowledge of preterm & enteral feeding:	22	44.0	50	100.0	50	100.0	<0.001*	<0.001*

(*) Statistically significant at $p < 0.01$

Table (3): Distribution of nurses' satisfactory level of enteral feeding practice throughout study phases (n=50)

Practice satisfactory level (70%+)	Study phases						P Pre-post	P Pre-FU
	Pre		IP		FU			
	No.	%	No.	%	No.	%		
Enteral feeding tube insertion:	0	0.0	50	100.0	50	100.0	<0.001	<0.001*
Administration of enteral feeding:	0	0.0	50	100.0	50	100.0	<0.001	<0.001*
Total:	0	0.0	50	100.0	50	100.0	<0.001	<0.001*

(*) Statistically significant at $p<0.01$

Table (4): Comparison of nurses' total mean scores of knowledge and practice throughout study phases

Scores of:	Study phases (total mean± SD)			P
	Pre (n=50)	IP (n=50)	FU (n=50)	
Knowledge: Raw score (0-29)	16.3±4.0	28.6±0.7	27.0±1.6	<0.001*
Standardized (0-100)	56.1±13.9	98.6±2.4	93.1±5.6	<0.001*
Practice: Raw score (0-26)	9.6±1.9	25.6±0.6	24.3±1.1	<0.001*
Standardized (0-100)	36.9±7.3	98.6±2.4	93.6±4.1	<0.001*

(*) Statistically significant at $p<0.01$

Table (5): Correlation between nurses' knowledge and practices mean scores and their characteristics throughout the study phases

		Spearman's rank correlations					
		Pre		Post		FU	
		Knowledge	Practice	Knowledge	Practice	Knowledge	Practice
Practice	r	-0.07	--	0.97	--	0.97	--
	p-value	0.609	--	0.001*	--	0.001*	--
Age	r	-0.29	-0.25	0.12	0.04	0.12	0.03
	p-value	0.039*	0.08	0.393	0.782	0.404	0.817
Qualification	r	0.30	-0.04	-0.03	0.21	-0.07	0.08
	p-value	0.037*	0.804	0.836	0.137	0.643	0.56
Experience (pediatric)	r	-0.17	-0.13	0.17	0.03	0.15	0.24
	p-value	0.251	0.364	0.242	0.844	0.296	0.087
Experience (Enteral feeding)	r	-0.19	-0.09	0.19	0.04	0.17	0.18
	p-value	0.198	0.533	0.187	0.769	0.244	0.207

(*) Statistically significant at $p<0.01$

4. DISCUSSION

The present study demonstrated a marked improvement in nurses' knowledge and practices regarding preterm infants and enteral feeding following the implementation of guidelines. Before the intervention, less than half of the nurses had an unsatisfactory level of total knowledge, and all of them demonstrated an unsatisfactory level of practice, particularly in enteral feeding procedures. This finding may be attributed to the limited exposure to formal training programs, as the majority of nurses in the current study

reported not attending any enteral feeding related courses. Similar findings were reported by [12] in a study about "The Effect of Nasogastric Tube Feeding Educational Interventions on Critical Care Nurses' Knowledge and Performance," which demonstrated a significant improvement in nurses' knowledge and practice following the educational program on enteral feeding.

In addition, [8] conducted a study about "Efficacy of a Nasogastric Tube Educational Intervention for Nursing Staff," which reported that structured educational interventions tailored to nurses' clinical needs and guided by evidence-based protocols are effective. The study revealed that implementing a targeted educational program led to significant improvements in NGT management, including insertion, placement verification, feeding, and medication administration. The significant improvement in nurses' knowledge immediately after the intervention, with sustained gains at follow-up, highlights the effectiveness of guidelines in enhancing both understanding and retention of information.

The current study findings, regardless of the nurses' characteristics, provide strong evidence for the effectiveness of the implemented enteral feeding guidelines. This success could be attributed to the clarity of the educational materials and the suitability of the teaching methods used, which met the learning needs of all the nurses involved. The findings of the present study also revealed that while nurses' total mean knowledge and practice scores declined one month after the intervention of guidelines, they remained significantly higher than in the pre-intervention phase. [12] reported that knowledge and practice scores decreased three months after the educational interventions, but it was better than pre-education scores. Considering these findings, enteral feeding refreshers are recommended for NICUs nurses to keep them updated and competent.

The improvement observed across all knowledge domains related to preterm infants and enteral feeding suggests that the intervention successfully addressed critical knowledge gaps. The dramatic increase in knowledge related to enteral feeding definition, methods, advantages, and complications is particularly important, as enteral feeding is a high-risk procedure in preterm infants. Similar improvements were reported by [13] in a study entitled "Efficacy of Safety Measures and Discharge Planning Guidelines on Nurses' Knowledge of Enteral Nutrition for Comatose Patients," which concluded that there was a statistically significant improvement in nurses' overall knowledge regarding enteral feeding from the pre-intervention to the post-intervention phase.

In relation to practice, the current study revealed that none of the nurses demonstrated satisfactory enteral feeding practices before the intervention. However, following the guidelines, all nurses achieved satisfactory practice levels, which were maintained at follow-up. This finding strongly supports the effectiveness of combining theoretical education with hands-on training. Comparable results were reported by [1], who conducted a study about "Effect of educational nursing guidelines regarding enteral feeding on nurses' knowledge and practices at critical care units" and concluded that the implementation of educational nursing guidelines about enteral feeding had a positive impact on nurses' practices regarding enteral feeding at both the post-intervention and

follow-up phases. The results of the present study showed no correlation between knowledge and practice scores during the pre-intervention phase, indicating inadequate translation of knowledge into clinical practice before the intervention. This finding suggests that nurses may have relied on routine practices rather than evidence-based knowledge. This suggests that guidelines play a key role in bridging the gap between knowledge and practice.

The strong positive correlation between nurses' knowledge and practice scores observed after the intervention further confirms that improved knowledge positively influences clinical practice. The persistence of this correlation at the follow-up phase indicates sustained learning and retention. This finding aligns with Benner's theory of skill acquisition, which emphasizes that clinical competence is built upon sound theoretical knowledge, while no such correlation was found prior to intervention. Supporting this result, [14] reported a significant positive correlation between nurses' knowledge and practice levels following the intervention. These consistent findings underscore the importance of knowledge acquisition in influencing nurse's practical skills and emphasize the significance of enhancing neonatal intensive care unit nurses' knowledge to promote better clinical practices and ultimately enhance infants' outcomes in the context of enteral feeding.

Concerning correlations between nurses' knowledge and practice scores and their characteristics, the present study showed a positive correlation between nurses' knowledge and their qualifications, while age showed a weak negative correlation at the preintervention phase. The significant negative correlation between age and knowledge at baseline may reflect outdated knowledge among older nurses, possibly due to limited exposure to recent training programs. Conversely, the positive correlation between qualification and knowledge emphasizes the role of higher education in enhancing theoretical understanding. This finding is consistent with [15], who reported a statistically significant relationship between nurses' total knowledge scores and their educational level before the implementation of the guidelines. However, the findings partially disagreed with [15], as only a weak positive correlation was identified between nurses' age and knowledge during the pre-implementation phase. Furthermore, the current study finding revealed no significant correlation between nurses' practices and their characteristics throughout the study phases. This result is in agreement with [16], who reported no correlation between nurses' practices and personal characteristics before implementation, immediately after, or three months following program implementation. Continuous training programs should be prioritized regardless of nurses' age or years of experience to ensure high-quality pediatric enteral feeding care.

In conclusion, the findings of the current study are largely consistent with existing literature supporting the effectiveness of guidelines in improving nurses' knowledge and practices related to preterm care and enteral feeding. Although some studies highlight challenges in translating knowledge into practice, the strong and sustained improvements observed in this study indicate that well-designed, targeted guidelines can significantly enhance nursing practice and contribute to safer and higher-quality neonatal care.

5. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion:

The implementation of guidelines regarding enteral feeding for preterm infants has a profound and positive impact on nurses' knowledge and practice at post and follow up intervention, in which nurses who received guidelines had higher mean post- test scores of knowledge and practices compared to pretest.

5.2 Recommendation:

Based on the findings of the current study, the following recommendations are suggested:

- Standardized enteral feeding guidelines should be integrated into the mandatory orientation program for all newly hired nurses in NICUs.

- Visual aids, such as posters and bedside checklists, should be available in the NICUs to provide nurses with quick reference for enteral feeding procedures.

- Regular 'refresher' training sessions (every 6 months) are essential to prevent knowledge decay and ensure that nursing staff remain updated with the latest evidence-based practices.

- Encouraging nurses to pursue higher education and specialized certifications in neonatal care to improve their baseline clinical judgment.

- Developing a periodic evaluation system to monitor nurses' compliance with the established enteral feeding guidelines and providing feedback to improve performance.

- Further research is recommended to study the direct impact of improved nursing practice on preterm infants' clinical outcomes, such as growth rates and the incidence of necrotizing enterocolitis.

6. LIMITATIONS

There were no limitations in the current study.

Abbreviations

ANOVA	Analysis of Variance
ASPEN	American Society for Parenteral and Enteral Nutrition
BAPEN	British Association for Parenteral and Enteral Nutrition
EF	Enteral Feeding
FU	Follow Up
GI	Gastrointestinal
IP	Immediate Post
NGT	Nasogastric Tube
NICUs	Neonatal Intensive Care Units
SPSS	Statistical Package for Social Science

Declarations

Ethical Considerations

This study was part of a Master thesis; primary approval was attained from the research ethical committee in the Faculty of Nursing, Cairo University. All nurses who participated in the study were informed about the aim, procedure, benefits, and nature of the study and the written consent was obtained by the research investigators. The research investigators emphasized that participation in the study was voluntary, and nurses can refuse to participate in the study without any reason and obtained data was only used for the research purpose. The confidentiality of information was assured, and the nurses had the right to withdraw from the study at any time during the study without any effect on their job.

Availability of data and materials

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Competing Interests

The authors declare that they have no competing interests.

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