Journal of Information Systems Engineering and Management
2025, 10(52s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

Effect of Simulation-Guided by Intervention on Nurses' Performance and Satisfaction regarding Nasogastric Tube at Neonatal Intensive Care Unit

Reda Rabea Mohamed Battran[1], Dr. Taghreed Hussien Aboelola[2*], Amjaad Saleh Obied Alanazi[3], Meznaha Sgier Ageel Alanzi[4], Mozainaa Sgier Ageel[5], Sabra Mohamed Ahmed[6], Huda Shawky Mahamud[7,8], Samya Mohamed Ahmed Hegazy[9]

[1]Pediatric Nursing Department, Faculty of Nursing, El Fayoum University, Egypt

[2]PHD, RN- Public Health Nursing Department, College of Nursing, Northern Border University, Arar, Saudi Arabia, Orcid: 0000-0002-7996-697X, Email: tagreed.mohammed@nbu.edu.sa

[3]BSN, RN, Nursing director North Medical Tower, Arar, North Medical Tower, amgaada@moh.gov.sa

[4]BSN, RN, Nursing Care supervisor, Arar, North Border Health Cluster, Nursing Administration, Email: meznaha@moh.gov.sa

[5]GN, RN, Seniors Nurse in CSSD Department, Arar Maternity and Children Hospital in Arar, Email: mozainaa@moh.gov.sa

[6]Assistant Professor of Pediatric Nursing, Faculty of Nursing, Sohag University

[7]Assistant Professor of Pediatric Nursing, Faculty of Nursing, Helwan University, Cairo, Egypt, Email: hoda_shawky@nursing.helwan.edu.eg

[8]Pediatric Nursing Department, College of Nursing, University of Hilla, Babylon, Iraq. Orcid: 0009-0008-1856-8418, Email: drhudashawky@hilla-unc.edu.iq.

[9]Assistant Professor of Pediatric Nursing, Pediatric Nursing Department, Faculty of Nursing, Tanta University, Egypt.

***Corresponding Author:** Dr. Taghreed Hussien Aboelola, PHD, RN- Public Health Nursing Department, College of Nursing, Northern Border University, Arar, Saudi Arabia, Orcid: 0000-0002-7996-697X, Email: tagreed.mohammed@nbu.edu.sa.*

ARTICLE INFO

Received: 25 Dec 2024

Revised: 15 Feb 2025

Accepted: 25 Feb 2025

ABSTRACT

Background: In intensive care units (ICUs), the administration of nasogastric tube is a common practice. Simulation-based interventions serve as a bridge between theoretical knowledge and practical application, enhancing nursing skills prior to engaging with neonates in real-world settings. This ultimately elevates the standard of care and safeguards the well-being of neonates.

The aim of this study: was to assess the impact of simulation-based interventions on nurses' performance and satisfaction concerning nasogastric tube procedures in the Neonatal Intensive Care Unit.

Research design: The study used a quasi-experimental design.

Setting: It was carried out at Sohag University Hospital's Neonatal Intensive Care Unit.

Sample: The study involved a convenient sample of 50 nurses working in the unit. Data collection tools; included a nasogastric tube questionnaire, an observational checklist, and a nurses' satisfaction scale.

Results: The findings indicated a highly significant difference in the knowledge, practice, and satisfaction levels of the nurses studied. Prior to the implementation of the simulation-based intervention, over two-thirds of the nurses exhibited a poor

Journal of Information Systems Engineering and Management
2025, 10(52s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

understanding, and more than half demonstrated unsatisfactory practices regarding nasogastric tube procedures. Conversely, following the intervention, the majority of nurses displayed a good level of knowledge and satisfactory practice. The results highlighted a significant improvement in nurses' performance post-intervention compared to pre-intervention levels.

Conclusion: The study established that simulation-based interventions significantly enhance nurses' performance and satisfaction related to nasogastric tube procedures.

Recommendations: It is recommended that simulation-based interventions be incorporated as an effective training method for nurses regarding nasogastric tube administration.

Keywords: Nurses' Performance, Nasogastric tube, Satisfaction, Simulation- guided by intervention.

INTRODUCTION

Continuous enteral feeding is beneficial for pediatric patients in the intensive care unit as it mitigates the catabolic response to injury, preserves the integrity of the bowel mucosa, reduces the translocation of gut bacteria, enhances wound healing, and lowers the risk of septic complications. However, the prolonged use of nasogastric tubes can lead to discomfort in the nose and throat for many pediatric patients (Donaldson &Yardley, 2024). If the tube is excessively wide or remains in place for an extended period, it may cause tissue irritation or damage (Leslie & Williams, 2024).

Simulation-guided interventions in nursing encompass a range of activities utilizing pediatric patient simulators, which include devices, trained personnel, realistic virtual settings, and role-playing, rather than merely working with mannequins. According to the National Council of State Boards of Nursing (NCSBN), clinical simulation is defined as an event that mimics clinical practice through various scenarios, including high-fidelity and medium-fidelity manikins, standardized patients, role-playing, skills stations, and computer-based critical thinking simulations, and has become a vital component of nursing education (Gomes *et al.*, 2020).

Simulation guided by intervention offers several benefits, including prompt feedback, opportunities for repetitive practice, adjustable difficulty levels, and the ability to tailor learning experiences. However, research indicates that nursing students often have limited chances to practice techniques on real patients during their undergraduate education. This constraint could negatively impact the proficiency of newly trained healthcare professionals, thereby heightening the likelihood of mistakes and jeopardizing patient safety (Cerra *et al.*, 2019). Additionally, nursing satisfaction plays a vital role in evaluating motivation, fulfillment, and the effectiveness of teaching methods. It indicates how well learners can provide outstanding service with a positive attitude, uphold a patient-centered approach, and exhibit teamwork abilities in various healthcare settings (Saied, 2022).

The Significance of this Study

It lies in the common practice of nasogastric tube, which is performed daily without incident, yet carries a slight risk of misplacement into the lungs during insertion or displacement from the stomach later on. Nurses are pivotal in all facets of nasogastric tube feeding. Additionally, while there has been considerable advancement in understanding nasogastric tube practices and outcomes in pediatric and neonatal populations, there remain knowledge gaps concerning the care of neonates, who are the most vulnerable (Ellet, 2024). Therefore, this study aims to enhance nurses' knowledge, practices, and satisfaction through the implementation of simulation guided by intervention related to nasogastric tube feeding in the Neonatal Intensive Care Unit (NICU).

Journal of Information Systems Engineering and Management
2025, 10(52s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

Aim of the Study

To determine the effect of simulation- guided by intervention on nurses' performance and satisfaction regarding nasogastric tube at the Neonatal Intensive Care Unit.

Research Hypotheses

Intervention-guided simulation is expected to positively enhance nurses' knowledge, practices, and satisfaction concerning nasogastric tube management in the NICU.

Subject and Methods

Research design

A quasi-experimental design (one group pre/ post-test design) was used to achieve the aim of the current study.

Settings

The study was carried out at NICU at Sohag University Hospital.

Subjects

A convenient sample of 50 nurses employed in the aforementioned setting during the study period, who provide care for neonates irrespective of their age, educational background, or years of experience.

Tools for Data Collection

This study utilized three instruments for data collection.

Tool I:

The nasogastric tube questionnaire was created by the researchers following a review of relevant national and international literature (Nicole & Phillips, 2020). This instrument comprised two sections:

Part 1 gathered information on the demographic characteristics of nurses, including age, gender, education, and years of experience.

Part 2 consisted of a structured multiple-choice questionnaire administered at three intervals (pre, immediately post, and two months later) to evaluate nurses' knowledge regarding nasogastric tubes for neonates. This section included: 1. Definitions, purposes, indications, and complications of nasogastric tubes (8 questions). 2. Preparation and knowledge required prior to nasogastric tube insertion (4 questions). 3. The nurse's role during nasogastric tube insertion (8 questions). 4. The nurse's role following nasogastric tube insertion (4 questions). The scoring system assigned one point for each correct answer and zero for incorrect responses. Nurses' knowledge levels were categorized as poor (less than 50%), fair (50-75%), and good (more than 75%).

Tool II:

The nasogastric tube observational checklist (pre/posttest) was adapted from previous studies (Bourgault *et al.*, 2019). This checklist assessed nurses' practices related to nasogastric tube management in neonates, covering 4 items on assessment and preparation, 4 items on practices before tube insertion, 10 items during tube insertion, and 5 items after tube insertion. The scoring system for the observational checklist was as follows: 2 points for correctly completed items, 1 point for partially completed items, and 0 points for items not completed.

According to Alfar *et al.*, (2020), nursing practices were classified as satisfactory or unsatisfactory based on the total score, with scores below 80% deemed unsatisfactory and scores above 80%

Journal of Information Systems Engineering and Management
2025, 10(52s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

considered satisfactory.

Tool III:

Nurses' Satisfaction Scale: Nurse Satisfaction with the simulation experience was measured using the National League for Nursing (NLN) satisfaction scale. This scale comprises five components, each rated on a 5-point Likert scal., where a score of 1 indicated 'strongly disagree', 2 indicated 'disagree', 3 indicated 'undecided', 4 indicated 'agree', and 5 indicated 'strongly agree'. The total score ranged from 5 to 25, with higher scores reflecting greater satisfaction. The scale included questions regarding the effectiveness of the teaching methods utilized in the simulation, the variety of learning materials and activities provided to enhance learning, enjoyment of the simulation-based teaching, the motivational quality of the teaching materials, and the appropriateness of the simulation for learning purposes. Scoring System: Nurses' satisfaction levels were categorized as unsatisfactory for scores below 80%, while scores of 80% or above were deemed satisfactory.

METHOD

Validity and Reliability:

Five pediatric nursing professionals examined the tools for comprehensiveness, clarity, relevance, and applicability in order to assess the content validity. The reliability of internal consistency, assessed using Cronbach's alpha coefficient, yielded scores of 0.933 for Tool I, 0.887 for Tool II, and 0.92 for Tool III.

Ethical Considerations:

A letter from Sohag University's dean of the nursing faculty obtained official approval. The NICU management and the researchers interacted to clarify the study's purpose and obtain their agreement and collaboration for its execution. Informed consent was obtained from the participating nurses after explaining the study's aims and benefits, and the researchers assured the nurses of the freedom to leave the study at any moment. Additionally, they received assurances that the information they provided would remain private.

Pilot study

Ten percent of the sample, or five nurses, participated in a pilot study to assess the generated tools' usability, simplicity, clarity, and applicability. Any necessary adjustments were then made. This preliminary investigation was integrated into the research's entire sample. Approval was granted by the director of Sohag University Hospital, and the study took place from early May 2023 to late October 2023. Before the interviews began, the researchers greeted each nurse, gave their introductions, and explained the nature and goal of the study. There were four separate stages of the research project:

The first phase was the assessment phase, in which tool (I) part (1) was used to interview each nurse before the program to learn more about their characteristics. Tool (I) parts (2), III, and III were used to assess the nurses' knowledge, practice, and satisfaction with nasogastric tubes.

II - Planning Phase, where the objectives, priorities, and expected outcomes were defined based on the previous phase's findings to address the practical needs, knowledge gaps, and satisfaction of nurses concerning neonate nasogastric tubes. The researchers organized five sessions, comprising two theoretical and three practical, for the participating nurses.

The simulation-guided intervention

An educational program was developed and updated, encompassing both theoretical and practical sessions focused on the nasogastric tube. The primary aim of the simulation-guided intervention sessions was to ensure that, by the conclusion of the sessions, nurses would gain knowledge and skills

Journal of Information Systems Engineering and Management
2025, 10(52s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

that enhance their performance and satisfaction with the nasogastric tube in the Neonatal Intensive Care Unit (NICU). The specific objectives of the program included: defining the nasogastric tube, identifying its purpose, enumerating its indications, demonstrating care procedures, recognizing common complications, and performing proper documentation. During the implementation phase, the simulation-guided intervention was structured to enhance nurses' performance and satisfaction concerning the nasogastric tube in NICUs through five sessions, comprising two theoretical and three practical sessions, each lasting approximately 30-45 minutes. Each session commenced with feedback from the previous session, followed by a summary at the end. Researchers were present in the study settings three days a week from 9 a.m. to 1 p.m., conducting individual interviews with each nurse using the previously mentioned study tools. The participating nurses were organized into subgroups of varying sizes (6-8 nurses per group). A simplified booklet, provided in Arabic, served as supportive material, addressing all relevant knowledge and practices related to the nasogastric tube, developed after reviewing the pertinent literature and assessing the actual needs of the nurses involved in the study. Various teaching methods were employed, including lectures, small group discussions, visual aids, brainstorming sessions, demonstrations, re-demonstrations with necessary equipment, and the use of a simulation manikin available in the hospital's teaching clinical lab to facilitate the simulated education program. A variety of teaching media were utilized, including handouts, PowerPoint presentations, diagrams, flipcharts, and illustrated videos concerning nasogastric tubes.

The theoretical and practical sessions were conducted as follows:

During the first theoretical session, the researchers gave a brief introduction, greeted the nurses, thanked them for taking part in the study, and described the goals of the learning sessions. This session addressed the definition, purpose, indications, and complications associated with the nasogastric tube.

The second theoretical session focused on the nurse's responsibilities before, during, and after the insertion of the nasogastric tube. The third practical session involved training the participating nurses on the preparation of neonates and the necessary practices prior to nasogastric tube insertion. The fourth practical session included clinical demonstrations and re-demonstrations of the nasogastric tube procedure conducted in the faculty clinical lab, utilizing a simulation manikin. After the faculty lab sessions, the trainees were brought to Sohag University Hospitals' newborn critical care unit for a live re-demonstration under the researchers' supervision, which guaranteed their competency and confidence in carrying out the treatments on their neonates.

In the fifth practical session, questions about the nasogastric tube were answered and feedback on the prior sessions was gathered. After giving out a post-test, the researcher thanked each participating nurse for taking part in the study.

In the Evaluation Phase:

The nurses' performance and satisfaction were reassessed immediately after the simulation-guided intervention (post-test) and again one month later (follow-up) to evaluate the impact of the simulation-guided intervention.

Statistical Analysis:

The data were organized, coded, and converted into a custom form suitable for computer entry. SPSS version 22 was utilized for data input and analysis. Graphical representations were generated using the Excel application. Quantitative data were expressed as mean and standard deviation (SD), and a t-test was used to compare the same group on the pretest and posttest. Percentages and numbers were used to illustrate quantitative facts. Using Pearson correlation, the link between quantitative variables that were regularly distributed was evaluated. A P-value threshold of 0.05 was used to evaluate

Journal of Information Systems Engineering and Management
2025, 10(52s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

statistical significance, as follows: A statistically significant P-value was defined as less than 0.05, while a very statistically significant P-value was defined as less than 0.001.

RESULTS

According to Table (1), 76% of the nurses were female, and 62% of them were above 25. Their average age was 24.8 ± 4.6 years. Regarding educational qualifications, 70% of the nurses had completed a Technical Institute of Nursing, while 34% held a Baccalaureate degree in Nursing. Regarding their professional experience, 48% had between 5 and less than 10 years of experience, and 32% had more than 5 years of experience.

Table (2) reveals a significant improvement in the nurses' knowledge about nasogastric tubes, with a difference that was highly statistically significant before, immediately following, and one month following the simulation guided by intervention (P<0.001).

Table (3) shows that prior to the intervention, 68% of nurses had a poor understanding of nasogastric tubes. However, following the simulation, their knowledge level rose to a good level of 92.0%, and one month after the simulation, it further increased to 94.0%. A highly significant difference was noted in the knowledge levels before and after the intervention (P<0.001).

Table (4) illustrates a highly statistically significant difference in practice levels before, immediately after, and one month after the simulation guided by intervention. It is evident 50% of the nurses in this table demonstrated unsatisfactory practice in relation to nasogastric tube insertion before the program, whereas this figure improved to 100% immediately after and 96% one month post-intervention, indicating a satisfactory level of practice. Additionally, 68% of the nurses exhibited an unsatisfactory level of practice after nasogastric tube insertion before the simulation- guided by intervention, which improved to 96% immediately after the simulation- guided by intervention and 92% one month post-intervention, reflecting a satisfactory level of practice.

Figure 1 illustrates the distribution of the practice levels of the nurses studied concerning the nasogastric tube procedure at three intervals: before the simulation intervention, immediately after, and one month following the intervention. It was found that 92% of the nurses exhibited an unsatisfactory practice level prior to the simulation intervention, which decreased to 8% immediately post-intervention, and subsequently, 90% achieved a satisfactory practice level one month after the simulation intervention.

A month following the simulation intervention, the distribution of nurse satisfaction scores is shown in Table 5, indicating that a greater proportion reported satisfaction following the intervention and at the one-month of intervention.

Table 6 indicates a positive correlation among the nurses' knowledge, practice, and satisfaction levels after participating in the simulation guided by intervention on the nasogastric tube procedure, with a statistically significant p-value p<0.001. Knowledge and practice ($r = 0.558$, $p < 0.001$), knowledge and satisfaction ($r = 0.223$, $p < 0.001$), and practice and satisfaction ($r = 0.333$, $p < 0.001$) all showed significant positive connections, according to the correlation analysis.

Table 1: Demographic characteristics of the studied nurses (n=50)

Demographic characteristics	**No.**	**%**
Age (Years)		
< 25 years	31	62
25 - ≥ 36 years	19	38
Mean ± SD	**24.8 ± 4.6**	
Gender:		
Male	12	24
Female	38	76

Journal of Information Systems Engineering and Management
2025, 10(52s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

Qualifications:		
Technical Institute of nursing	35	70
Baccalaureate degree in nursing	15	30
Years of experience:		
< 5 years	14	28
5 – <10 years	25	50
10 - ≥15 years	12	24

Table 2: Comparison between the studied nurses' knowledge regarding nasogastric tube pre, immediately post, and one month post- simulation- guided by intervention (n=50)

Nurses' knowledge regarding nasogastric tube	Pre-simulation - guided by intervention		Immediately Post-simulation-guided by intervention		One month Post-simulation-guided by intervention		F	P-value
	No	%	No	%	No	%		
Definition			50	100	50	100	99.5	<0.001**
- Correct	30	60.0	0	0.0	0	0.0		
- Incorrect	20	40.0						
Indications							78.6	<0.001**
- Correct	24	48.0	49	98.0	46	92.0		
- Incorrect	26	52.0	1	2.0	4	8.0		
Nurses role before insertion	26	52.0	47	94.0	45	90.0	93.8	<0.001**
- Correct	24	48.0	3	6.0	5	10.0		
- Incorrect								
Nurses role during insertion	22	44.0	46	96.0	47.0	94	87.4	<0.001**
- Correct	28	56.0	4	4.0	3.0	6.0		
- Incorrect								
Nurses role after insertion							132.2	<0.001**
- Correct	19	38.0	46	96	46	92.0		
- Incorrect	31	62.0	4	4.0	4	8.0		

(**) highly statistical significance at p < 0.001

Table 3: Total nurses' knowledge level regarding nasogastric tube pre, immediately post, and one month post- simulation- guided by intervention (n=50)

Total nurses' knowledge level	Poor		Average		Good		F	P-value
	No.	%	No	%	No	%	98.8	0.000**
Pre- simulation- guided by intervention	33	68.0	15	28.0	2	4.0		
Immediately post simulation- guided by intervention	0	0.0	4	8.0	46	92.0		
One month Post- simulation- guided by intervention	0	0.0	3	6.0	46	94.0		

(**) Highly significant at P<0.001

Journal of Information Systems Engineering and Management
2025, 10(52s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

Table 4: Comparison between the studied nurses' practice regarding nasogastric tube pre, immediately post, and one month post- simulation- guided by intervention (n=50)

Nurses' practice	Pre- simulation-guided by intervention				Immediately Post-simulation- guided by intervention				One month Post-simulation- guided by intervention				F	P
	Unsatisfactory		Satisfactory		Unsatisfactory		Satisfactory		Unsatisfactory		Satisfactory			
	No	%	No	%	No	%	No	%	No	%	No	%		
Before nasogastric tube insertion	25	50.0	25	50.0	0	0	50	100	2	4.0	48	96.0	95.7	0.000**
During nasogastric tube insertion	27	54.0	23	46.0	5	10.0	45	90.00	4	8.0	46	92.0	98.7	0.000**
After nasogastric tube insertion	34	68.0	16	32.0	2	4.0	48	96.0	4	8.0	46	92.0	77.9	0.000**

(**) Highly significant at P<0.001

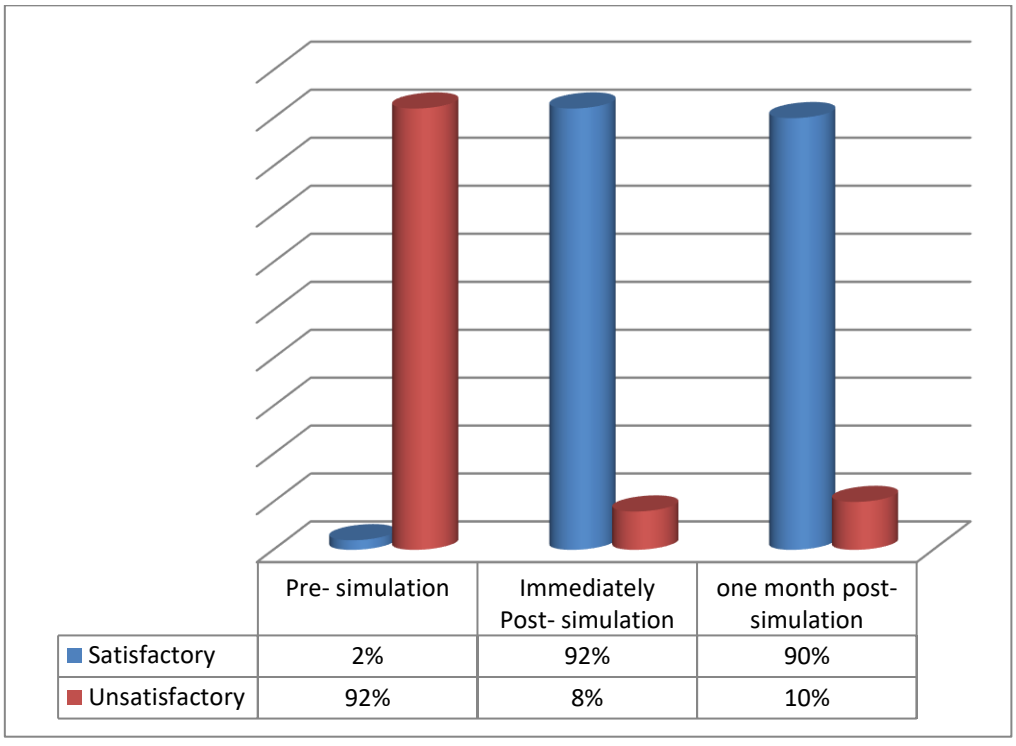

Figure 1: Total nurses' practice level regarding nasogastric tube pre, immediately post, and one month post- simulation- guided by intervention (n=50)

Journal of Information Systems Engineering and Management
2025, 10(52s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

Table 5: Nurses' satisfaction level immediately and after one month Post- simulation-guided by intervention (no=50)

Satisfaction items	**Post-** simulation- guided by intervention				**One month Post-** simulation- guided by intervention				**F**	**P**
	Unsatisfactory		**Satisfactory**		**Unsatisfactory**		**Satisfactory**			
	N	%	N	%	N	%	N	%		
The simulation-guided intervention's teaching methods proved effective.	2	4%	48	96%	1	2%		98%	87.1	<0.001**
The simulation, guided by intervention, offers diverse learning materials and activities that enhance my learning experience."	1	2%	49	98%	1	2%	49	98%	88.1	<0.001**
The simulation-guided intervention made learning engaging and enjoyable for me."	2	4%	48	96%	3	6%	47	94%	94.1	<0.001**
The simulation-guided intervention's teaching materials were highly motivating.	3	6%	47	94%	4	8%	46	92%	50.4	<0.001**
The application of the simulation-guided intervention was suitable for effective learning	1	2%	49	98%	2	4%	46	96%	69.1	<0.001**

(**) Highly significant at P<0.001

Table 6: Correlations between Knowledge, Practice, and Satisfaction in Nurses Before and After Simulation-Guided Intervention (n= 50)

Variable	**Correlation coefficient**	**P-value***
Knowledge- satisfaction	0.558	<0.001**
Knowledge- practice	0.223	<0.001**
Satisfaction - practice	0.333	<0.001**

(**) Correlation is highly significant at the <0.001

DISCUSSION

Nurses play a vital role in caring for pediatric patients with nasogastric tubes, and evidence-based practice is crucial for optimal patient outcomes. Simulation serves as a valuable tool for nursing educators to prepare future nurses for practical scenarios. Performance is defined as the accomplishment of a task evaluated against established standards of accuracy, completeness, cost, and efficiency. A growing body of research indicates that inadequate preparation and lack of skills among nurses are associated with negative outcomes, particularly in critically ill newborns (McGaghie *et al.*, 2019). Therefore, this study aimed to determine the effect of simulation- guided by intervention on nurses' performance and satisfaction regarding nasogastric tube at the Neonatal Intensive Care Unit.

The study's results revealed that more than three fifths of the participating nurses were under 25 years of age, with a predominance of female nurses. The results of the current study may be explained by the historical context in which nursing education in Egyptian institutions was predominantly available to females until recent years, which could account for the high female representation.

Journal of Information Systems Engineering and Management
2025, 10(52s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

Regarding years of experience, it was found that less than half of the nurses who were surveyed had worked in the NICU for five to ten years. A study by Deshnukh & Shinde (2024) found that most participants (71.67%) had less than 5 years of clinical experience. This finding is in contradiction to that study. According to a study by Issa *et al.* (2019), almost one-third of the nurses polled had one to five years of experience.

The findings of the current study revealed that a significant improvement in the nurses' knowledge about nasogastric tubes, with a difference that was highly statistically significant before, immediately following, and one month following the simulation guided by intervention. This suggests that the implementation of simulation guided by intervention was highly effective, highlighting the critical need to comprehend the objectives of such educational interventions to enhance knowledge. This conclusion is further supported by Cerra *et al.* (2019), who found that simulation training positively influenced nursing students' knowledge.

The results of the current study that prior to the intervention, less than three quarters of nurses had a poor understanding of nasogastric tubes. However, following the simulation, their knowledge level rose to a good level of, and one month after the simulation. A highly significant difference was noted in the knowledge levels before and after the intervention. From the researchers' point of view, it reflected the positive effects of simulation guided by intervention. This suggests that effective simulation guided by intervention enhances their comprehension of knowledge. The results of this study contradict the findings of Taha (2014), who reported that most nurses demonstrated accurate knowledge regarding nasogastric tube procedures.

The current study found that most nurses exhibited an unsatisfactory level of knowledge concerning nasogastric tube insertion, potentially due to a lack of scientific teaching activities in the clinical setting, such as informal teaching conducted by direct supervisors to update nurses' knowledge. This finding is consistent with Ahmed (2017), who reported that nurses' knowledge was generally inadequate in both El-Moassat Hospital and the main university hospital.

Regarding the nurses' practices related to nasogastric tube, it was observed that a highly statistically significant difference in practice levels before, immediately after, and one month after the simulation guided by intervention. From the researcher's perspective, enhancing nurses' skills is crucial to meet the specific needs of neonates requiring nasogastric tube, thereby reducing the incidence of adverse events during hospitalization and reflecting the effectiveness of the simulation guided by intervention at pre, immediate post, and one month post simulation guided by intervention. This may be attributed to the absence of guidelines to aid their memory or insufficient training opportunities. These results contradict Taha (2014), who reported superior performance among his study participants regarding nasogastric tube procedures, as well as Amer (2011), who indicated that the overall performance level related to nasogastric tube care was satisfactory. Similarly, these findings differ from those of Saleh (2018), who found that the highest mean score was recorded before and during nasogastric tube insertion, while the lowest mean score occurred post-insertion.

These findings are consistent with Seliman (2021), who reported unsatisfactory nursing practices related to nasogastric tube in the specified ICUs. Conversely, these results contradict those of Amer (2011), who demonstrated a significant improvement in overall performance following program implementation, with pre-test performance at 39.3%, post-implementation at 71.7%, and a slight decrease to 70.2% in the follow-up test, similar to Ahmed (2017), who found that nurses' practices during nasogastric tube were satisfactory, scoring between 62.5% and 80%.

The results of the present study demonstrated that the practice levels of the nurses studied concerning the nasogastric tube procedure at three intervals: before the simulation intervention, immediately after, and one month following the intervention. From the researchers' perspective, this outcome reflects the beneficial impact of simulation guided by intervention on enhancing the practice levels of

Research Article

the nurses studied, effectively raising their clinical practice scores. This finding corroborates earlier studies by Gomes *et al.* (2020), who concluded that such educational methods significantly improved performance. Additionally, Beal *et al.* (2019) found that clinical simulation served as an effective strategy for boosting student performance compared to other teaching methods. The current study's results indicated that a greater proportion of nurses reported satisfactory levels of practice following the simulation-based education, echoing the findings of Zapko *et al.* (2019), who noted that participants expressed satisfaction with their simulated education experience, felt confident in their practice, and regarded the simulations as grounded in sound educational principles, essential for effective learning.

The results of the current study indicated that a greater proportion reported satisfaction following the intervention and at the one-month of intervention. The research conducted by Saied (2019) indicated that students expressed satisfaction with the simulation experience, and their self-confidence scores improved following the simulation guided by intervention session. Moreover, Mattson (2023) who reported that students were highly satisfied with the simulation learning activity.

The findings of the current study demonstrated a positive correlation between the nurses' knowledge, practice, and satisfaction levels after participating in the simulation guided by intervention on the nasogastric tube procedure, with a statistically significant, which aligns with Abd Elbaky (2019), who noted that there was a positive correlation between knowledge, procedural intervention, and overall performance following the simulation education program. These results confirm the success of simulation guided by intervention which reflected good nurses' knowledge lead to effective practice, and associated with satisfaction with the nasogastric tube technique.

Last but not least, the current study examined the interrelationships between the various study outcomes, specifically knowledge and performance. Data analysis demonstrated a statistically significant relationship between nurses' training and their knowledge about nasogastric tube insertion, which may be attributed to the importance of an effective training program for improving nurses' knowledge. This finding concurs with Abdeen (2021), who found that trained nurses had a satisfactory level of knowledge, and contradicts Saleh (2018), who found no significant difference between trained and non-trained nurses regarding their knowledge about studied invasive procedures, as well as Mohamed (2021), who found no statistically significant relation between nurses' knowledge about studied chemotherapeutic agents and their age nor their years of experience and experience with chemotherapy.

These findings are consistent with Ahmed (2017), who identified a highly significant difference between the levels of knowledge and practice among nurses. Similarly, Mohamed (2021) reported a positive correlation between nurses' knowledge and their practices concerning the studied chemotherapeutic agents, which was also highly statistically significant. Additionally, Saleh (2018) and Amer (2011) found a positive correlation between nurses' knowledge and their performance. In contrast, Abd El-Aziz (2023) reported no statistically significant correlation between the levels of knowledge and practice among nurses.

CONCLUSION

Based on the current study's findings, it can be said that simulation-based interventions significantly enhance nurses' performance and satisfaction related to nasogastric tube procedures.

RECOMMENDATIONS:

The present study's conclusions support the following recommendations:

- Simulation-based interventions should be used as a useful tool for educating nurses on the administration of nasogastric tubes.

Research Article

- It is essential to regularly review and update the written guidelines, administrative policies, and procedures regarding nursing practices for nasogastric tubes in both normal and premature infants.
- Additionally, ongoing training for nurses in the Neonatal Intensive Care Unit (NICU) on the latest developments related to nasogastric tubes is advised.

REFERENCES

[1] Abd El- Aziz, E. (2023). Assessment of nurses' knowledge and practice related to nosocomial infection control measures at intensive care units, Zagazig University hospitals, unpublished master thesis, Faculty of Nursing, Zagazig University.

[2] Abdeen, M. (2021). The impact of training program on the performance of nurses working in surgical wards at Zagazig University Hospitals, unpublished doctorate thesis, Faculty of Nursing, Zagazig University.

[3] AbdElbaky, M. (2019). Impact of Simulated Education program on Nurses' Performance of Invasive Procedure at Intensive Care Units: Evidence-Based Practice. International Journal of Nursing Didactics; 08(12): 13–20.

[4] Ahmed, W. (2017). Assessment of nurses' knowledge and practice in relation to nasogastric tube feeding, unpublished master thesis, Faculty of Nursing, University of Alexandria.

[5] Alfar, N., El-sheik, O., Hassan, R., & Selim, M. (2020). The effect of applying a nursing care bundle on controlling central venous line infection in neonatal intensive care units. Mansoura Nursing Journal; 7(1), 56-74.

[6] Amer, H. (2011). Impact of training program on the performance of nurses working in intensive care units in Zagazig University hospitals, unpublished doctorate thesis, Faculty of Nursing, Zagazig University, 2011.

[7] Beal, M., Kinnear, J., Anderson, C., Martin, T., Wamboldt, R., & Hooper, L. (2019). The Effectiveness of Medical Simulation in Teaching Medical Students Critical Care Medicine. Simulation in Healthcare: The Journal of the Society for Simulation in Healthcare; 12(2): 104–116.

[8] Bourgault, A., Ipe, L., O' Dea, P., Swartz, S., & Weaver, J. (2019). Development of evidence-based guidelines and critical care nurses' knowledge of nasogastric tube, AACC, Vol. 27, No. 4.

[9] Cerra, C. La, Dante, A., Caponnetto, V., Franconi, I., Gaxhja, E., Petrucci, C., Alfes, C. M., & Lancia, L.) 2019(. Effects of high-fidelity simulation-based on life-threatening clinical condition scenarios on learning outcomes of undergraduate and postgraduate nursing students: a systematic review and meta-analysis1; 2(2): 103–117.

[10] Deshmukh, M. & Shinde, M. (2024). Impact of Structured Education on Knowledge and Practice Regarding Venous Access Device Care among Nurses. International Journal of Science and Research (IJSR); 3(5): 895-901, Education and Practice, 5(4). https:// doi.org/10.5430/jnep.v5n4p52.

[11] Donaldson, L., & Yardley, I.. (2020). Patient safety matters: reducing the risks of nasogastric tubes. Clinical Medicine, Vol 10, No 3: 228–30.

[12] Ellet, M. (2024). What is known about method of correctly placing gastric tubes in adults and children, Gastroenterology Nursing 27, , 253- 259

Research Article

[13] Gomes, J. L., Railka De Souza, A., Kumakura, O., Zanchetta, C, Dias Coutinho, R., Helena, M., & Lima, M. (2020). Clinical Simulation for Teaching of Wound Evaluation and Treatment; 15(1):55-77.

[14] Issa, S., AL Madwah, K., & Al Mosawi, H. (2019). Evaluation of Nurse's Knowledge in Management of Premature Baby in Neonatal Units, The Basics of Nursing, Basrah Nursing College, Basrah University, Basrah, Iraq, American Journal of Nursing Research; 6, (5), 291-295.

[15] Leslie, C., & Williams, T. (2024). A review of the nursing care of enteral feeding tubes in critically ill adults: Part1, Crit Care Nursing, 20 (6).

[16] Mattson, R. (2023). Effects of High Fidelity Simulation on Knowledge Acquisition, Self-Confidence, and Satisfaction with Baccalaureate Nursing Students; 14(1):55-76

[17] McGaghie, W. C., Issenberg, S. B., Cohen, E. R., Barsuk, J. H., & Wayne, D. B. (2019). Does simulation-based medical education with deliberate practice yield better results than traditional clinical education? A meta-analytic comparative review of the evidence. Academic Medicine; 86(6): 706– 711. https: // doi. org/ 10. 1097/ ACM. 0b013e3 18217e119

[18] Mohamed, A. (2021). Nurses' practice and adverse health effects on nurses dealing with chemotherapeutic agents, Unpublished master thesis, Faculty of Nursing, Zagazig University, 2021.

[19] Nicole, M., & Phillips, A. (2020). Nasogastric tubes: an historical context (Clinical Practice), Med Surg Nursing, Volume 1, No.3.

[20] Nuraini, T., Afifah, E., Agustini, N., Pujasari, H., Masfuri, M., & Milanti, A. (2019). Human patient simulation to improve the attitude of the nursing students. Journal of Nursing Education and Practice. 5(4): 52.

[21] Saied, H. (2022). The Impact of Simulation on Pediatric Nursing Students' Knowledge, Self-Efficacy, Satisfaction, and Confidence. Journal of Education and Practice; 8(11): 95–102. http:// ezproxy. lib. uconn. edu/ login?url=https://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ1139 780&site=ehost-live

[22] Saleh, M. (2018). Nurses compliance to standards of nursing care in performing invasive procedures at Zagazig University Hospitals, unpublished master thesis, Faculty of Nursing, Zagazig University, 2018.

[23] Seliman, A. (2021). Effect of implementing nursing guidelines for tube feeding on the occurrence of aspiration among critically ill patients, published master thesis in critical care nursing, faculty of Nursing, Mansoura University.

[24] Taha, N. (2014). Comatosed patients: Impact of a training program provided for nurses working in critical care units, Zagazig University Hospitals on nurses' knowledge and performance levels as well as on patient outcome, unpublished doctorate thesis, Faculty of Nursing, Zagazig University.

[25] Zapko, K. A., Ferranto, M. L. G., Blasiman, R., & Shelestak, D. (2019). Evaluating best educational practices, student satisfaction, and self-confidence in simulation: A descriptive study. Nurse Education Today; 60, 28–34. https:// doi. org/ 10. 1016/ j. nedt. 2019.09.00