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ASSESSMENT OF KNOWLEDGE AND PRACTICE REGARDING NASOGASTRIC TUBE PLACEMENT AMONG NURSES WORKING IN A TERTIARY CARE HOSPITAL, LAHORE, PAKISTAN

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Abstract

BACKGROUND:
Nasogastric (NG) tube insertion is a routine yet critical nursing procedure, widely used for providing nutrition, administering medication, and decompressing the stomach in patients who are unable to eat orally. Nevertheless, if not inserted properly, it may cause severe complications, which include aspiration pneumonia, respiratory distress, or death.

OBJECTIVE:
This study was conducted to evaluate nurses' knowledge and practices related to NG tube insertion in a pediatric tertiary care setting in Lahore, Pakistan.

METHODOLOGY:
The study was conducted during a period of six months at the Children's Hospital, Lahore, using a descriptive, cross-sectional design. Using a simple random sampling method, data were collected from 268 registered nurses who met the inclusion criteria. In order to measure the presence of theoretical knowledge and practical skills, a structured questionnaire and an integrated checklist based on the validated instruments were adopted. The data was being analyzed through descriptive statistical methods in SPSS 26.

RESULTS:
Findings showed that while most nurses (84.7%) were aware of general guidelines and 87% could identify clinical indications for NG tube insertion, only 63% recognized contraindications, and 25% lacked awareness of possible complications. Practical implementation also revealed shortcomings—only 23.9% confirmed tube placement using recommended techniques such as aspiration or pH testing. Additionally, over half of the participants (58.6%) had never received formal training in NG tube placement.

CONCLUSION:
The study highlights a clear disconnect between knowledge and practice, pointing to the urgent need for structured and evidence-based training. Regular skill-building sessions, simulation-based learning, and reinforcement of standardized protocols are essential to ensure safe and effective NG tube management, particularly in pediatric care, where precision is vital to patient outcomes.

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INTRODUCTION

Nasogastric (NG) tubes are flexible medical devices inserted through the nasal passage into the stomach, commonly used to provide nutritional support, administer medications, and assist in diagnostic or therapeutic procedures for patients with gastrointestinal disorders (Karen A. McQuillan, 2020). Beyond nutrition delivery, NG tubes are also essential in gastric decompression for intestinal obstructions and help minimize dumping syndrome—a condition marked by diarrhea, nausea, abdominal discomfort, fatigue, and dizziness resulting from rapid gastric emptying (Behire Sancar, 2023).

Despite being a routine clinical intervention, NG tube misplacement remains a serious global concern. Studies show that 44–59% of nasogastric or orogastric tubes placed in neonates end up incorrectly positioned, potentially resulting in life-threatening complications such as aspiration pneumonia and gastric perforation (Wenjuan Huang, 2025). This is compounded by significant knowledge gaps among nurses: one study found that 65.7% of nurses lacked adequate understanding of correct NG tube insertion technique, with only 13% of nurses in Pakistan demonstrating sound competency in using clinical equipment, including NG tube placement and care (Shamshad Akhtar, 2023).

Globally, NG tube insertion is an extremely common procedure, with an estimated 10 million insertions performed annually in Europe and 1.2 million in the United States (Kurt Boeykens, 2023). Yet incorrect placement—particularly when the tube enters the trachea or lungs—has remained a leading cause of severe injury or death for decades. Notably, a substantial proportion of nurses and patients report considerable knowledge deficits regarding safe insertion and verification practices, especially in pediatric settings (Karen A. McQuillan, 2020).

Historically, NG tube use dates back centuries, from early silver tube applications by Aquapendente in the 1600s and John Hunter's flexible leather tube in the 1790s, to Levin's introduction of the rubber NG tube in 1921, which paved the way for modern polyvinyl chloride, silicone, and polyurethane tubes valued for their biocompatibility and flexibility (Bomzah, 2020).

In contemporary practice, NG tube feeding is indispensable for patients unable to feed orally due to illness, surgery, or critical conditions, and enteral feeding is generally preferred over parenteral nutrition owing to its physiological and economic advantages. However, tube misplacement continues to be directly linked to patient harm and mortality, most often through accidental entry of feed into the respiratory tract (Behire Sancar, 2023). Data from England's National Patient Safety Agency revealed multiple fatalities linked to NG tube misplacement even after safety guidelines were introduced, underscoring the persistence of this preventable clinical error (Decloedt & Maartens, 2019).

Malnutrition in critically ill patients is associated with higher infection rates, prolonged ventilator dependence, extended ICU stays, and increased mortality, making early enteral nutrition through NG tubes a key preventive strategy. Ensuring safe insertion and monitoring depends heavily on adequately trained nursing and medical staff (Bourgault & Halm, 2019). National data indicate that a considerable number of hospitalized patients receive enteral nutrition, with blind NG tube insertion carrying a 1–3% risk of pulmonary misplacement and a 19% risk of esophageal misplacement (Ankita Kunwar, 2019).

Regional variations in misplacement rates further highlight the scope of this problem: The United Kingdom reports misplacement in 1.3–2.4% of cases, with fatal outcomes in nearly 28% of these, while pediatric misplacement rates range from 20.9% to 43.5% in some studies. In Pakistan specifically, only 13.3% of nurses show adequate proficiency in essential procedures including NG tube insertion, pointing to an urgent need for structured competency training (Nalukenge, 2016).

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While enteral nutrition is generally safe, associated complications—gastrointestinal, mechanical, metabolic, and infectious—can be serious, with pulmonary aspiration posing the greatest risk, particularly among critically ill patients with reduced consciousness or impaired airway protection (Daniels et al., 2018). Critical care nurses play a pivotal role in implementing safe feeding protocols, yet many face barriers such as insufficient formal training, weak documentation practices, understaffing, and unclear role clarity—factors that collectively compromise patient safety in NG tube management (Stewart, 2018; Nalukenge, 2016).

PROBLEM STATEMENT

Nasogastric (NG) tube insertion is a common nursing procedure performed for enteral feeding, medication administration, and gastric decompression. Despite being a routine clinical intervention, incorrect insertion of an NG tube remains a significant patient safety concern because inaccurate tube placement can result in serious complications such as aspiration pneumonia, respiratory distress, pneumothorax, esophageal injury, and even death.

Shamshad Akhtar (2023) revealed that 65.7% of nurses had inadequate knowledge regarding NG tube insertion guidelines, while studies by Nalukenge (2016), Ankita Kanwar (2019), and Reshid (2024) identified substantial gaps in nurses' practice.

In Pakistan, particularly in pediatric tertiary care settings, limited evidence is available regarding nurses' knowledge and practice related to NG tube insertion. Considering the high frequency of NG tube use in pediatric patients and the serious consequences of tube misplacement, it is essential to evaluate whether nurses possess adequate knowledge and clinical practice.

OBJECTIVES OF THE STUDY

- To assess the nurse's theoretical knowledge of nasogastric tube insertion.
- To assess the clinical practices of nurses regarding nasogastric tube insertion.

OPERATIONAL DEFINITIONS

Knowledge Assessment:

- **Good Knowledge:** When a nurse's knowledge score is above 75% regarding NG tube insertion.
- **Partial Knowledge**: When a nurse's score ranges between 50% and 75%.
- **Poor Knowledge:** When the knowledge score is below 50%.

Practice Assessment:

- **Good Practice**: When a nurse scores 3 on the observational practice indicators.
- **Partial Practice**: When the score is 2.
- **Poor Practice**: When the score is 1.

Practice was evaluated using a direct observation checklist to score nurses' performance during NG tube insertion procedures using objective criteria.

METHODOLOGY

The present study employed descriptive, cross-sectional design. The research was carried out at Children's Hospital, Lahore, Pakistan. Staff nurses were selected using simple random sampling technique.

For evaluating nurses' knowledge and practices related to nasogastric (NG) tube insertion. Using the single-proportion formula, a sample size of 268 was calculated.

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Following an ethical review, a well-structured, and adopted questionnaire, along with an observational checklist, was administered (Nalukenge, 2016). Questionnaire consisted of three sections:

1. **Demographic data:** The demographic part included information on age, department, experience, qualifications, and specialized training.
2. **Knowledge Section:** The knowledge assessment section was adapted so that it had seven items, which were used to measure the knowledge of the nurses. All the questions were binary and were answered in the Yes or No format.
3. **Practice Section:** A checklist of 11 items was created to evaluate the practices of nurses with a response scale of 3, including not done, partially done, and well done.

Completed questionnaires were collected and secured safely. After the data collection, it was analyzed using statistical tools to assess the outcomes.

RESULTS & ANALYSIS

AGE:

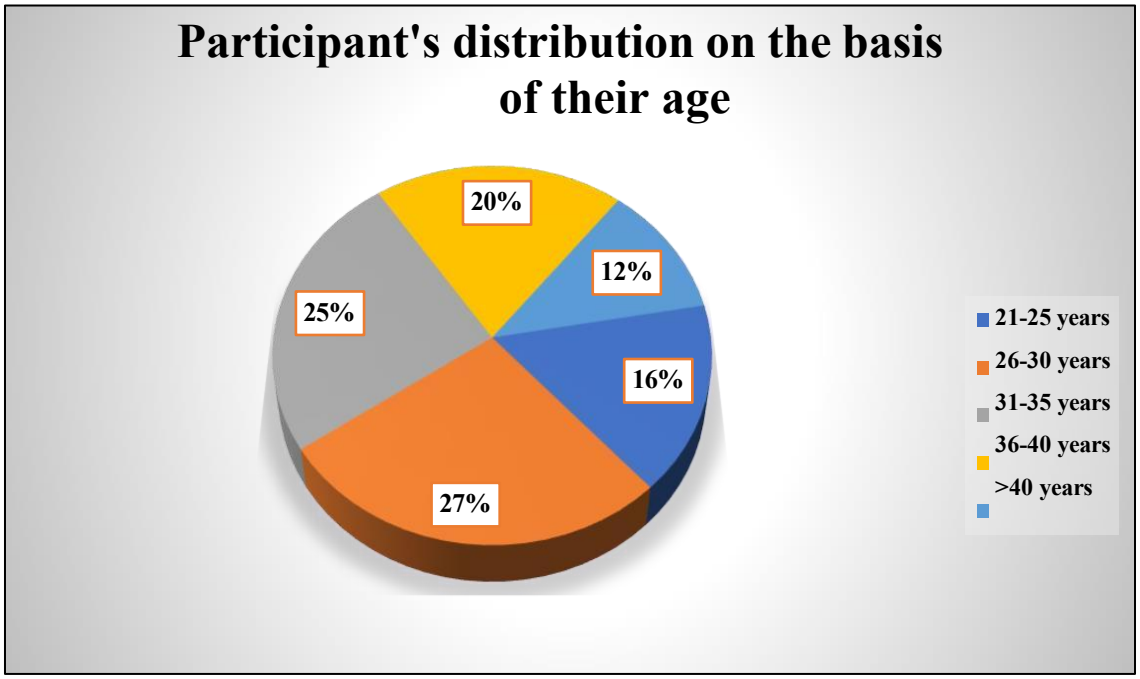


Figure 4.1: Distribution of participants based on their Age

The data in Fig. 4.1 represents the distribution of nurses across different age groups. The youngest age group, 21-25 years, comprises 43 nurses, accounting for 16% of the total population. The largest age group is 26-30 years, with 73 nurses, making up 27.2% of the total. The 31-35 years' age group is also significantly represented, with 67 nurses, accounting for 25% of the total. The age group of 36-40 years consists of 54 nurses, making up 20.1% of the total. The oldest age group, above 40 years, comprises 31 nurses, accounting for 11.7% of the total population. Overall, the data suggests that the majority of nurses fall within the 26-35 years' age range, indicating a relatively young workforce.

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PROFESSIONAL QUALIFICATION:

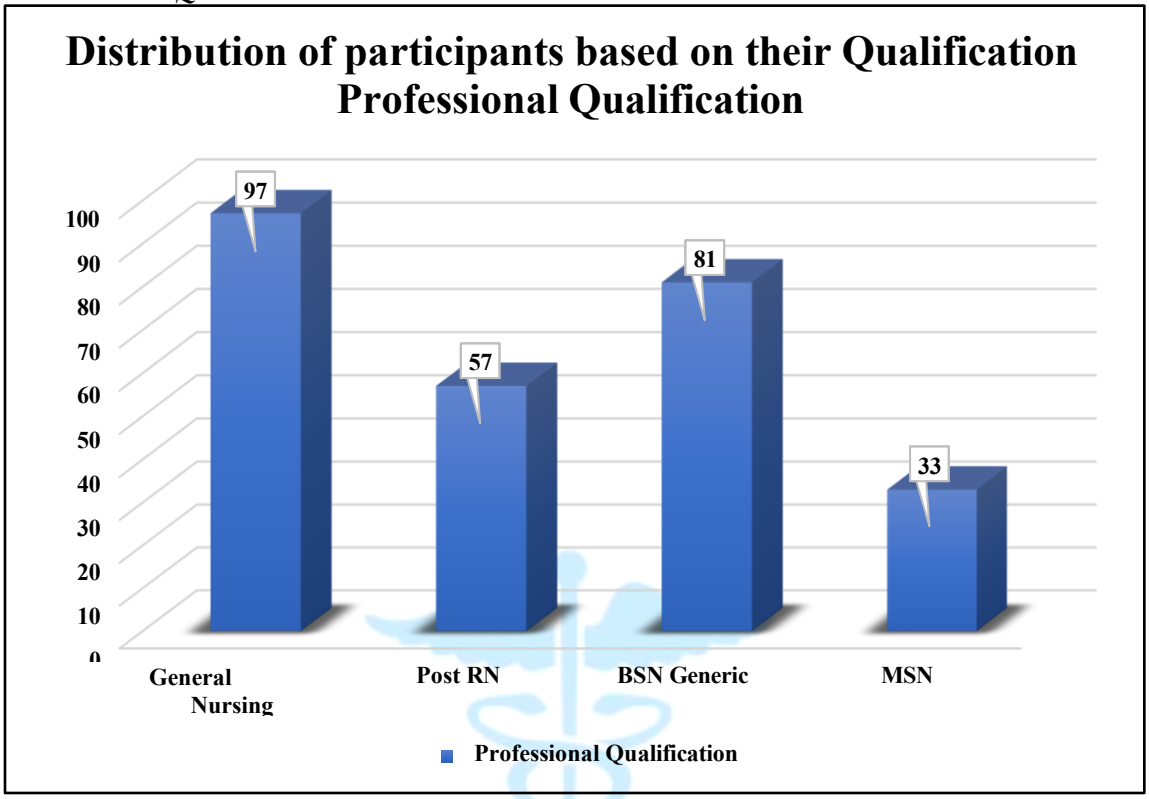


Figure 4.2: Distribution of participants based on their Professional Qualification

The data in Fig. 4.2 depicts the distribution of nurses based on their professional qualifications. The largest group of nurses holds a General Nursing Diploma, accounting
for 97 nurses (36.2%) of the total population. The second largest group consists of nurses with a Bachelor of Science in Nursing (BSN) Generic degree, comprising 81 nurses (30.2%) of the total. Nurses with a Post RN qualification make up the third largest group, with 57 nurses or 21.3% of the total. The group with the Master of Science in Nursing (MSN) degree is the smallest, accounting for only 33 nurses or 12.3% of the total population.

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WORKING DEPARTMENT:

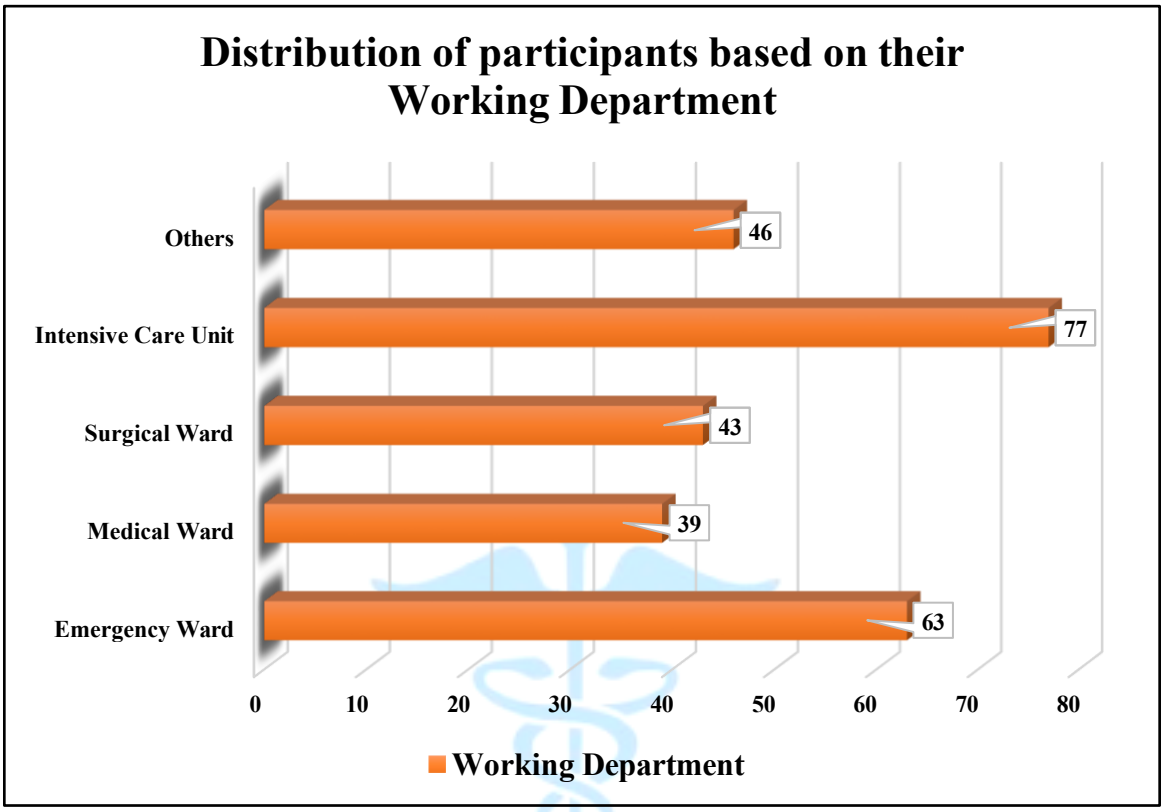


Figure 4.3: Distribution of participants based on their Working Department

The distribution of nurses across various working departments is revealed in Fig. 4.3. The Intensive Care Unit (ICU) emerges as the hub of nursing activity, with 28.7% of the total nursing workforce. The Emergency Ward follows closely, accounting for 23.5% of the nurses. In contrast, the Medical Ward has a relatively smaller share of nurses, at 14.6%. The Surgical Ward and other departments (like OPD, Pediatrics and Nursery) have moderate representations, with 16% and 17.2% of the nurses, respectively.

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WORKING EXPERIENCE:

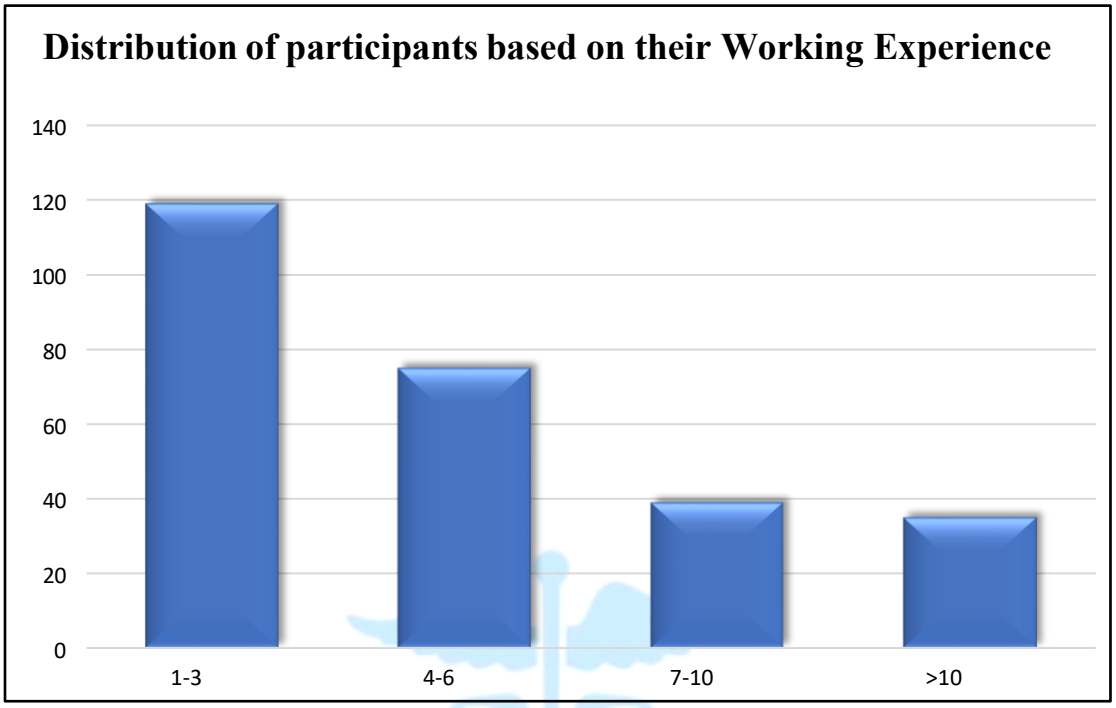


Figure 4.4: Distribution of participants based on their Working Experience

The data in Fig. 4.4 reveals that the majority of nurses (44.4%) have 1-3 years of working experience, indicating a relatively young and inexperienced workforce. The second largest group consists of nurses with 4-6 years of experience, accounting for 28% of the total. Nurses with 7-10 years of experience make up 14.6% of the workforce, while those with more than 10 years of experience constitute 13%. Overall, the data suggests that the nursing workforce is skewed towards less experienced nurses.

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TRAINING IN NG TUBE INSERTION:

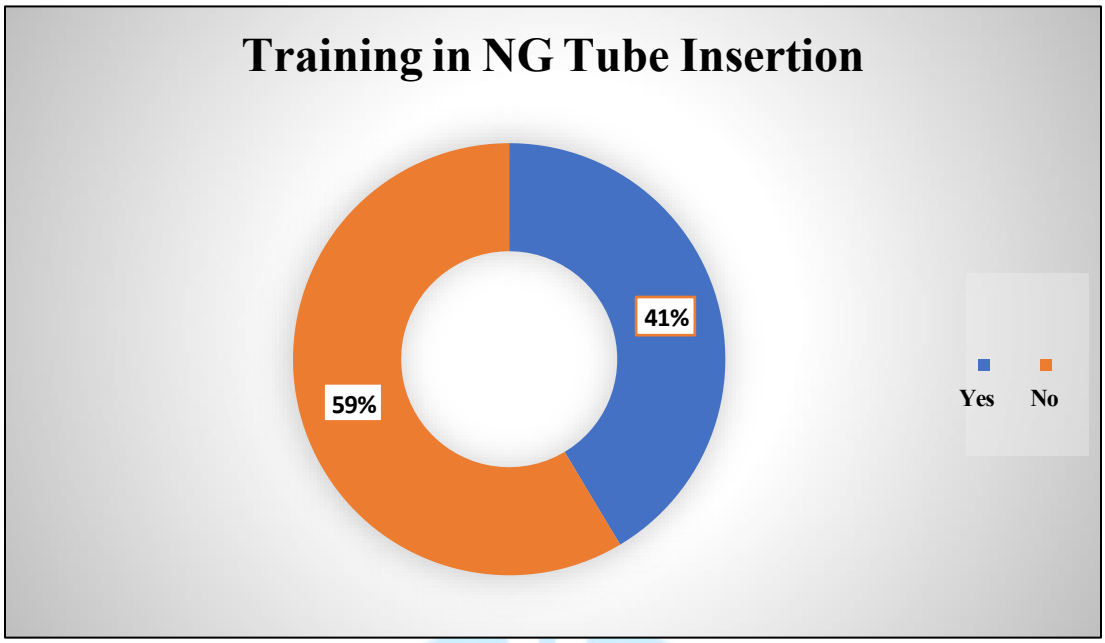


Figure 4.5: Distribution of participants based on their Training

The data in Fig. 4.5 reveals that the majority of nurses (58.6%) have not received training in NG tube insertion, while 41.4% have received training. This suggests a significant gap in training and potential competency in NG tube insertion among nurses.

Table 4.1: Knowledge About Variables: Descriptive Statistics

KNOWLEDGE			
Q 1: Do you know the standard guidelines for inserting an NG tube?			
Yes		No	
227 (84.7%)		41 (15.3%)	
Q 2: (a) Do you know the indications of the NG tube insertion?			
Yes		No	
233 (87%)		35 (13%)	
Q 2: (b) If yes, please mention the indications of the nasogastric tube insertion you know:			
Administration of Medications	Nutritional Support	Decompression of Stomach	Others
99 (42.3%)	69 (29.6%)	53 (22.7%)	12 (5.3%)
Q 3: (a) Do you know the contra-indications of the nasogastric tube insertion?			
Yes		No	
169 (63%)		99 (37%)	
Q 3: (b) If yes, please mention the contra-indications of the nasogastric tube insertion you know:			
Facial Injury & Airway Obstruction	Esophageal Stricture/Varices	Coagulation Abnormalities	Others
69 (40.8%)	41 (24.3%)	27 (15.8%)	32 (19%)
Q 4: (a) Do you know the determinants of selection of the nasogastric tube size?			
Yes		No	
221 (82.5%)		47 (17.5%)	

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Q 4: (b) If yes, mention the determinants of selection of the nasogastric tube size.			
Patients' Age	Patients' Medical Condition	Type of Feeding/ Medication	Others
53 (24%)	39 (17.6%)	89 (40.3%)	40 (18.1%)
Q 5: (a) Nasogastric tube is inserted in the right position confirmation.			
Yes		No	
213 (79.5%)		55 (20.5%)	
Q 5: (b) Confirmation method for right position of nasogastric tube.			
Visualization	Auscultation	Aspiration	Others
49 (23%)	31 (14.6%)	79 (37%)	54 (25.4%)
Q 6: Do you know about the steps of NG tube placement?			
Yes		No	
223 (83.2%)		45 (16.8%)	
Q 7 (a): Knowledge about potential complications of NG tube insertion.			
Yes		No	
201 (75%)		67 (25%)	
Q 7 (b) If yes, please mention the complications of the nasogastric tube insertion you know.			
Discomfort	Infection	Respiratory Distress	Others
57 (28.4%)	42 (21%)	73 (36.3%)	29 (14.3%)

Table 4.1 shows the results of the knowledge of nurses regarding NG tube insertion. This section revealed that the majority of nurses (84.7%) were aware of the standard guidelines for inserting a nasogastric (NG) tube. Additionally, 87% of nurses knew the indications for NG tube insertion. When asked to specify the indications, the most common responses were administration of medications (42.3%), nutritional support (29.6%), and decompression of the stomach (22.7%). The findings highlighted that 63% of nurses were aware of the contraindications for nasogastric (NG) tube insertion, while 37% were not. Of the known, the most commonly reported contraindications were facial injury and airway obstruction (40.8%), esophageal stricture/varices (24.3%), coagulation abnormalities (15.8%), and others (19%), like respiratory distress, any fistula, bleeding, etc. The results identified that 82.5% of nurses knew the determinants of NG tube size selection, while 17.5% did not. Among those who knew the determinants, the most common responses were the type of feeding/medication (40.3%), patients' age (24%), patients' medical condition (17.6%), and others (18.1%), like patients' weight, purpose of NG tube insertion, presence of any obstruction, etc.

Additionally, 79.5% of nurses confirmed that they verify the correct placement of the nasogastric (NG) tube, while 20.5% did not. Among those who confirmed, the most common methods used to verify correct placement were aspiration (37%), visualization (23%), auscultation (14.6%), and others (25.4%), including chest X-ray, tube length, pH testing, etc. It's identified that 83.2% of nurses knew the steps for NG tube placement, while 16.8% did not. A majority of nurses (75%) were aware of the potential complications of NG tube insertion, while 25% were not. Among those who knew the complications, the most common responses were respiratory distress (36.3%), discomfort (28.4%), infection (21%), and others (14.3%), like skin irritation, aspiration pneumonia, tube obstruction, etc.

The general understanding of nurses concerning the insertion of a nasogastric (NG) tube was deemed satisfactory, as most showed understanding of the guidelines, indications, contraindications, methods for verification, and possible complications. However, a considerable

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minority lacking knowledge of contraindications, verification methods, and possible complications indicated there were still critical gaps in everyone's knowledge. This reinforces the need for continued educational sessions to equip nurses with the appropriate skills and information to perform an NG-tube insertion, which will improve patient care.

Table 4.2: Summary Statistics concerning variables on Practice Assessment

PRACTICE				
Sr. No	Items	Not Done	Partially Done	Well Done
		F (%)	F (%)	F (%)
1	Introducing and explaining the procedure to the patient	11 (4.1)	149 (55.6)	108 (40.3)
2	Preparation for the procedure, i.e., swabs, water, stethoscope, gloves, litmus paper, the appropriate size of tube, 20ml syringe	8 (3)	121 (45.1)	139 (51.9)
3	Hand washing and putting on gloves	12 (4.5)	161 (60)	95 (35.5)
4	Positioning the patient in a sit-up position with the head a bit flexed	11 (4.1)	147 (54.9)	110 (41)
5	Selecting the appropriate size of the NG tube according to the age of the patient and measuring the length of the NG tube	10 (3.7)	159 (59.3)	99 (37)
6	Cleaning the nostril and demonstrating proper insertion of the tube from the tip, behind the ear up to the tip of the sternum	14 (5.2)	139 (51.9)	115 (42.9)
7	Check the position of the tube by using the stethoscope and syringe, aspirating the gastric contents, or use of litmus paper or by radiographic method	13 (4.8)	191 (71.3)	64 (23.9)
8	Keeping the tube in a firm and secure position	16 (6)	173 (64.6)	79 (29.4)
9	Leaves the patient in a comfortable position	11 (4.1)	181 (67.5)	76 (28.4)
10	Clear the trolley and wash your hands	19 (7)	153 (57.1)	96 (35.9)
11	Document the work done and the findings	15 (5.6)	163 (60.8)	90 (33.6)

As presented in Table 4.2, a dominant number of nurses, 55.6% explicably and partially performed the task of introducing and explaining the procedure, while 40.3% performed at a moderate level. The practice regarding preparing the patients for the procedure was also being partially performed by 45.1% nurses and efficiently by 51.9%. A significant proportion of nurses (60%) partially performed the tasks, such as hand washing and putting on gloves, and (35.5%) performed well. A small percentage of nurses (3-4.5%) did not perform tasks such as introducing and explaining the procedure, preparing for the procedure, hand washing and

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putting on gloves, and positioning the patient, while others performed well. The task of selecting the appropriate size of the NG tube according to the age of the patient and measuring the length of the NG tube was partially performed by 59.3% of nurses and well performed by 37% of nurses.

The results show that a significant proportion of nurses (42.9-51.9%) partially performed tasks such as cleaning the nostril and demonstrating proper insertion of the tube, checking the position of the tube, keeping the tube in a firm and secure position, leaving the patient in a comfortable position, clearing the trolley and washing hands, and documenting the work done and the findings, while a notable proportion of nurses (23.9- 35.9%) performed these tasks well. Only a small percentage of nurses (4.1-7%) refrained from these tasks in total.

The incorporation of nasogastric (NG) tube insertion in the curriculum demonstrated differing levels of professional competence among nurses. Some practices were commendable while others were less satisfactory. a significant portion of nurses performed some NG tube related tasks. A major proportion also performed tasks to some extent. These results indicate the presence of foundational competencies. Still other results show a discrepancy between nursing education and practice that is in urgent need to be addressed. for optimal performance, simulated tasks and regular competency-based training should be provided to bolster nurses' skills and self-efficacy in NG tube insertion.

DISCUSSION

The assessment of theoretical understanding revealed that a majority of nurses were aware of the general guidelines (84.7%) and clinical indications (87%) related to NG tube insertion. However, deeper, critical aspects of knowledge—such as contraindications (only 63% awareness) and complications (with 25% entirely unaware)—were significantly underrepresented. This partial and fragmented understanding poses a serious threat to patient safety, particularly in high-risk settings such as pediatric and critical care units, where even minor procedural lapses can result in severe outcomes.

The findings reveal that periodic, evidence-based, and structured workshops targeted at enhancing nurse knowledge are essential. While the nurses in this study displayed moderate levels of theoretical understanding, the fragmented and occasionally outdated nature of their knowledge indicates the urgent need for curriculum revision and targeted clinical training.

Direct observation of clinical practice revealed notable inconsistencies between knowledge and execution. While several nurses showed awareness of procedural requirements, the complete and correct implementation of NG tube insertion protocols was rarely achieved. For instance, only 23.9% of the participants confirmed NG tube placement using evidence-based methods such as aspiration, pH testing, or radiography. Besides, components of essential procedures, such as hand hygiene (properly performed in only 60 percent), proper positioning of patients (65 percent), and documentation after the procedure (only 33.6 percent), were not carried out consistently. The frequent neglect of essential post-procedural procedures, including fixation and documentation, is related to both organizational and personal deficiencies

The practice deficits identified in this study may also be traced back to the 58.6% of nurses who had never received formal training. Bridging the knowledge-practice gap, particularly in vulnerable units like the ICU and pediatrics, it is imperative to ensure patient safety and procedural accuracy.

LIMITATIONS OF THE STUDY

- The study was conducted in a single tertiary care hospital, thus restricting the generalizability of findings to broader healthcare settings or national populations.
- Knowledge assessments relied on self-reported questionnaires, which may be influenced by social desirability bias or subjective overestimation of competence.
- The research did not explore qualitative or contextual factors such as staff burnout, unit workload, or administrative challenges, which could also impact practice.

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RECOMMENDATIONS

- Execute simulation-based training sessions related to NG tube insertion, coupled with evidence-based verification techniques, during quarterly workshops.
- To enhance adherence and the quality of documentation, implement checklists for each procedural step associated with NG tube insertion.
- Junior and novice nurses should be assessed and guided regarding procedural competencies by designated senior, experienced nurse mentors, thus establishing mentorship frameworks.
- Critical supplies such as sterile equipment, pH strips, and radiological verification tools must be readily accessible and available without interruption.

CONCLUSION

To summarize, the research discovered that nurses possessed a moderate level of theoretical knowledge concerning the insertion of nasogastric (NG) tubes, but they lacked sufficient practical knowledge and skills. Based on low rates of evidence-based verification and inadequate documentation practices or adherence to infection control standards, a number of significant issues emerged. Such inadequacies exemplify a persistent divergence between theory and practice, which poses a significant risk to patient safety, especially in high-acuity and pediatric areas. The literature supporting this theory is abundant and emphasizes the need for training, validation of competencies on a regular basis, and accountability from the organizations. Appropriate training, strong clinical oversight, and policy changes allow for enhanced adherence to procedures, reduced clinical risks, and improved safe and effective management of NG tubes in all healthcare settings.

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