Original Article

doi:10.31674/mjn.2026.v17i05.002

MJN

Nursing Care Guidelines for Nasogastric Tube-Related Hospital-Acquired Pressure Injuries: A Quasi-Experimental Pilot Study

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ABSTRACT

Background: Medical Device–Related Pressure Injuries (MDRPI), including Nasogastric Tube-Related Hospital-Acquired Pressure Injuries (NGT-HAPI), represents a preventable yet frequently overlooked complication in critically ill patients. Appropriate placement, securement, and ongoing monitoring of Nasogastric Tubes (NGT) are essential to minimize associated risks. **Objectives:** The primary objective is to examine the preliminary effects of implementing nursing care guidelines on the incidence of NGT-HAPI and selected patient outcomes. **Methods:** A quasi-experimental, non-randomized pilot study was conducted in the intensive care units of Assiut University Hospital, Egypt. A purposive sample of 60 adult patients was allocated into intervention and control groups based on bed availability and clinical flow. Data collection proceeded through three tools: baseline patient assessment, NGT assessment and monitoring, and evaluation of NGT-related pressure injury incidence. **Results:** There is a statistically significant difference (*p*-value 0.001) between the study group's 90% of patients who have no stage of NGT-HAPI and the control group's 66.6% who have first-degree and 26.7% who have second-degree NGT-HAPI, and about a quarter (26.7%) in the control group have skin breakdown with a statistically significant difference (*p*-value 0.004*). **Conclusion:** Implementation of structured nursing care guidelines was associated with a lower incidence of NGT-HAPI. While findings indicate a positive effect, causal interpretations should be made cautiously due to the quasi-experimental design.

Keywords: Nasogastric Tubes; Nursing Care; Nursing Guidelines; Patient Outcome; Pressure Injury

INTRODUCTION

Enteral Nutrition (EN) is a widely used method to maintain or restore patients' nutritional status through the gastrointestinal tract. It is recommended for patients whose gastrointestinal function is partially or fully intact due to its cost-effectiveness and lower risk of septic complications (Pereira *et al*., 2025). Enteral nutrition provides carbohydrates, amino acids, and micronutrients that help maintain intestinal barrier integrity and support immune function, commonly delivered via NGT or percutaneous endoscopic gastrostomy (Wang *et al*., 2025).

Misplacement or improper management of NGTs can lead to serious complications, including epistaxis, pneumothorax, sinusitis, nasopharyngeal lesions, and even fatal perforations (Zhang *et al*., 2025). Even though inserting NGT is usually regarded as routine, it is crucial to do so safely and effectively in order to prevent major and potentially fatal complications. Sinusitis and nasopharyngeal lesions, which both indicate pressure injuries related to NGTs, are complications that can result from nasogastric feeding (Vadivelu *et al*., 2023).

NGT-HAPI are a specific type of MDRPI resulting from NGT use (Schroeder & Sitzer, 2019). Nurses play a critical role in the management of NGTs, as they are responsible for safely administering nutrition, fluids, and medications, and monitoring patient responses. The quality of nursing care directly influences patient outcomes, including the incidence of NGT-related complications (Ail *et al*., 2024).

Hospital-acquired pressure injuries remain a prevalent and costly global healthcare challenge, negatively

Received: November 8, 2025 Received in revised form: February 21, 2026 Accepted: March 1, 2026

affecting patient quality of life, increasing morbidity and mortality, and imposing additional financial burdens on healthcare systems. Clinically, pressure injuries can present as pain, irritation, redness, swelling, blistering, or changes in tissue consistency (Alshahrani *et al*., 2024). According to Dirgar *et al*. (2024), specific sites commonly affected by MDRPI include the nostrils (31.9%), perioral area (21.3%), and cheeks (14.9%), with the nose and nostrils being particularly vulnerable among patients with NGTs or that are receiving positive-pressure ventilation. The nose was injured in 80% of patients with an NG tube, the nostril was injured in 85.7% of individuals receiving positive-pressure breathing without invasive procedures, and the cheeks were injured in 71.4% of patients who developed an MDRPI. Medical instruments, mainly endotracheal and NGT, frequently are contributors to pressure injuries among the critically ill unit patients (Coyer *et al*., 2020).

Despite the growing literature on MDRPI, limited interventional evidence exists on the effectiveness of structured nursing care guidelines in preventing NGT-HAPI, particularly in ICU settings and low- and middle-income countries. Therefore, this study evaluates the impact of implementing nursing care guidelines on NGT-HAPI incidence and patient outcomes to support safer and more effective NGT management.

Objectives

The primary objective is to examine the preliminary effects of implementing nursing care guidelines on the incidence of NGT-HAPI and selected patient outcomes. Secondary objectives are to assess the incidence of NGT-HAPI before and after implementing nursing care guidelines, to examine the impact of nursing care guidelines on patient outcomes, such as ICU length of stay and recovery, and to compare the effectiveness of structured nursing care guidelines between the intervention and control groups.

Research Hypothesis

Patients in the study group who received nursing care guidelines will experience a significantly lower incidence of NGT-HAPI compared with patients in the control group.

METHODOLOGY

Study Design and Sample

This quasi-experimental, non-randomized pilot study was conducted in three ICUs at Assiut University Hospitals, Egypt. A purposive sample of 60 critically ill patients meeting the inclusion criteria was recruited. Patients were assigned to intervention and control groups based on ICU bed availability and clinical flow. Sample size calculation was based on previous studies, with a 95% confidence interval, 80% power, 95% expected prevalence of critically ill patients, and 5% worst acceptable outcome (Taheri, 2017). The calculated sample size was 54 patients, increased to 60 to account for potential dropouts and to enhance the robustness of statistical analysis. It should be noted that allocation was non-randomized, which may introduce selection bias, and assessors were not blinded to group assignment, which represents a methodological limitation.

Inclusion Criteria

Adult patients aged 18–65 years, recently admitted to ICU, and NGT intubated for >48 hours.

Exclusion Criteria

Patients with pre-existing nasal ulcers or trauma, NGT intubation <48 hours, or in palliative/end-stage care.

Research Tools

Three tools were used

Tool I – Baseline Patient Assessment Tool: This was developed by the researcher following analysis of relevant literature and previous related studies (Flæten *et al*., 2024; Alshahrani *et al*., 2024) to collect demographic and clinical data, including health history, Acute Physiology and Chronic Health Evaluation II (APACHE II) score (Mumtaz *et al*., 2023), and Sequential Organ Failure Assessment (SOFA) score (Fayed *et*

al., 2022). Both scores were evaluated on admission. Cronbach's alpha = 0.87, indicating high internal consistency.

Tool II – Nasogastric Tube Assessment and Monitoring Tool: The tool consisted of three parts; two parts were developed by the researcher after analysis of relevant literature (Liu *et al*., 2023; Vadivelu *et al*., 2023).

Part 1: It involved nasogastric tube assessment data (date of insertion, date of removal, duration of the NGT, skin condition around the nostrils).

Part 2: It comprised of contributing factors for NGT-HAPI assessment (size of NGT, duration of NGT, occurrence of NGT re-intubation, use of lubricant during insertion, and use of a vasoconstriction agent during insertion).

Part 3: This part dealt with NGT-HAPI assessment sheet: adopted from Schroeder and Sitzer (2019) and modified by the researcher. Cronbach's alpha = 0.85, demonstrating good internal consistency across subscales.

Tool III*:* This tool comprised of evaluation of NGT-HAPI incidence, complications occurrence, and patient outcomes, including length of ICU stay and SOFA score. It was developed by the researcher after analysis of the relevant literature (Wu *et al*., 2024). Cronbach's alpha = 0.82, indicating acceptable internal consistency.

Face validity was assessed by three experts, and adjustments were made. Cronbach's alpha was calculated for all tools to confirm reliability. Construct validity was ensured by aligning items with established literature.

The three phases comprised the study: preparation, implementation, and evaluation.

Implementation Phase

All recently admitted patients to the previously mentioned units who met the inclusion criteria participated in this study. Patients' demographic and clinical profiles were assessed for each patient on admission by using Tool I. The control group received the routine NGT care that was applied by the nurses, and the intervention group received the nursing guidelines by the researcher until removal of the NGT. Nursing guidelines were applied by the researcher to the intervention group of NGT-intubated patients >48 h until removal.

The elements included, firstly, ensuring the correct positioning and stabilization of the tube, and examining the area beneath or next to the tube for any blisters, abrasions, or discolorations. If the tube was not functioning properly, the pressure was to be released, and the tube was to be relocated. The date and time of the adjustment were noted, and the tape was applied and repositioned as needed. Frequent assessments were conducted to monitor changes in condition and to maintain dryness of the area, exploring early potential preventive strategies for hospitalized patients. The correct size of the NGT was chosen, and the NGT was inspected and properly fitted. The skin around the device was assessed, and the NGT was repositioned, with the device was moved to assess the skin and removed when possible. The appearance of the skin was monitored, and the presence of nostril discomfort, as well as the occurrence and stage of any NGT-HAPI, was evaluated.

Evaluation Phase

Patients were evaluated for the occurrence of NGT-HAPI on the 3rd, 7th, and 14th day of NGT intubation, and complications occurrence in the intervention group after implementing the nursing guidelines.

Data Analysis

Statistical analyses were performed using IBM SPSS version 28. Data normality was assessed using the Shapiro–Wilk test prior to inferential analyses (Shapiro & Wilk, 1965). Categorical variables were compared using chi-square tests, while independent sample *t*-tests were applied for continuous outcomes with normally distributed data. Differences in proportions were evaluated using the two-sample proportion test. It should be noted that using the chi-square test for repeated measurements represents a methodological limitation, as longitudinal or mixed-effects models could provide more robust analyses.

Ethical Considerations

The research obtained ethical clearance from the Faculty of Nursing Research Ethics Committee, Assiut University, Egypt with reference number 1120240853 on 26th August, 2024.

RESULTS

Table 1: Distribution of Demographic and Clinical Characteristics of Patients between Intervention and Control Groups (n = 60)

Demographic and clinical data		Intervention group (n=30)		Control group (n=30)		*p*-value
		No.	%	No.	%	
Age group	18-30 years	13	43.3	10	33.3	0.875
	31-40 years	3	10.0	3	10.0	
	41-50 years	6	20.0	7	23.3	
	51-65 years	8	26.7	10	33.3	
	M±SD	38.47 ± 16.49		42.07 ± 16.19		0.397
Sex	Male	20	66.7	22	73.3	0.573
	Female	10	33.3	8	26.7	
APACTHE II score on admission	M±SD	16.13 ± 5.81		17.03 ± 6.87		0.586

APATCHE II: Acute Physiologic Assessment and Chronic Health Evaluation; Frequencies - Number and percentage

Table 1 presents the demographic and clinical characteristics of the studied patients. There were no statistically significant differences between the intervention and control groups regarding age ($p = 0.397$), sex distribution ($p = 0.573$), or APACHE II score on admission ($p = 0.586$). These findings indicate that both groups were comparable at baseline.

Table 2: Comparison of NGT-related Complications between Intervention and Control Groups (n = 60)

Complications		3-day					7-day					14-day				
		Intervention group (n=30)		Control group (n=30)		*p*-value	Intervention group (n=30)		Control group (n=30)		*p*-value	Intervention group (n=30)		Control group (n=30)		*p*-value
		No.	%	No.	%		No	%	No.	%		No.	%	No.	%	
Stage of NGT pressure injury	None	30	100.0	30	100.0	-	30	100.0	21	70.0	0.001*	27	90.0	2	6.7	0.001*
	First degree	0	0.0	0	0.0		0	0.0	9	30.0		3	10.0	20	66.6	
	Second degree	0	0.0	0	0.0		0	0.0	0	0.0		0	0.0	8	26.7	
Pressure injury	Present	0	0.0	0	0.0	-	0	0.0	9	30.0	0.001*	3	10.0	28	93.3	0.001*
	Not present	30	100.0	30	100.0		30	100.0	21	70.0		27	90.0	2	6.7	
Skin Breakdown	Present	0	0.0	0	0.0	-	0	0.0	0	0.0	-	0	0.0	8	26.7	0.004*
	Not present	30	100.0	30	100.0		30	100.0	30	100.0		30	100.0	22	73.3	
Epistaxis	Present	0	0.0	0	0.0	-	0	0.0	0	0.0	-	0	0.0	0	0.0	-
	Not present	30	100.0	30	100.0		30	100.0	30	100.0		30	100.0	30	100.0	
Skin Discoloration	Present	0	0.0	8	26.7	0.002*	6	20.0	10	33.3	0.458	16	53.3	29	96.7	0.001*
	Not present	30	100.0	22	73.3		24	80.0	20	66.7		14	46.7	1	3.3	
Blisters	Present	0	0.0	0	0.0	-	0	0.0	0	0.0	-	0	0.0	0	0.0	-
	Not present	30	100.0	30	100.0		30	100.0	30	100.0		30	100.0	30	100.0	

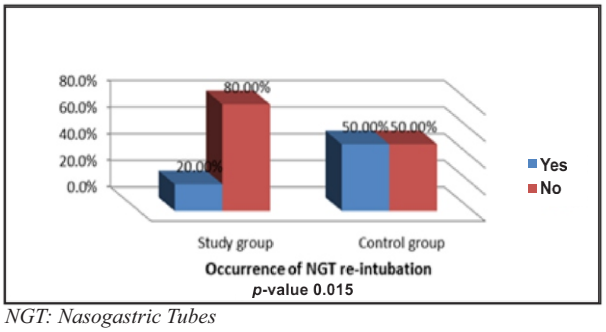
*NGT: Nasogastric Tube; Chi-square test (number and percentage), *Significant level at P value < 0.05*

Table 2 shows that at 14 days, none of the patients (100.0%) in the study group experienced skin breakdown, whereas approximately one-quarter (26.7%) of the control group did, with the difference being statistically significant ($p = 0.004$). Most patients (90.0%) in the intervention group at 14 days do not have pressure injury, but 93.3% in the control group have statistically significant pressure injury (p-value 0.001*).

Patient outcomes	Intervention group	Control group	*p* value
	M ± SD	M ± SD	
Length of ICU stay	15.80 ± 3.86	19.77 ± 5.85	0.003*
SOFA score on admission	9.97 ± 2.33	10.47 ± 3.17	0.084
SOFA score on middle length of stay	6.20 ± 1.58	8.23 ± 3.71	0.008*
SOFA score on discharge	3.60 ± 1.10	5.53 ± 4.83	0.037*

SOFA: Sequential Organ Failure Assessment
ICU: Intensive Care Unit
*Chi-square test (Number & percentage), *Significant at p < 0.05*
Independent-sample t-test Significant at p < 0.05.*

Table 3 compares clinical outcomes between the intervention and control groups. There was a statistically significant difference in ICU length of stay, with the intervention group demonstrating a shorter mean stay compared to the control group (15.80 ± 3.86 vs. 19.77 ± 5.85 days; $p = 0.003$). No statistically significant difference was observed between groups in SOFA score on admission ($p = 0.084$), indicating comparable baseline severity. However, significant differences were found in SOFA scores at the middle of ICU stay ($p = 0.008$) and at discharge ($p = 0.037$), with lower scores observed in the intervention group.



NGT: Nasogastric Tubes

Figure 1: Comparison of NGT re-intubation Occurrence between Intervention and Control Groups

Figure 1 illustrates the occurrence of NGT re-intubation in both groups. A significantly lower proportion of patients in the intervention group required NGT re-intubation compared with those in the control group (20.0% vs. 50.0%, p = 0.015). Conversely, a higher proportion of patients in the intervention group did not require re-intubation compared with those in the control group (80.0% vs. 50.0%).

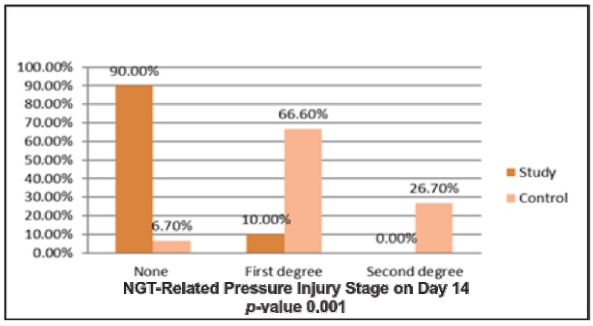


Figure 2: Occurrence of NGT Re-intubation in the Intervention and Control Groups at 14 Day

Figure 2 illustrates the distribution of NGT-related pressure injury stages on Day 14. A significantly higher proportion of patients in the intervention group had no pressure injury compared with those in the control group (90.0% vs. 6.7%, $p = 0.001$). In contrast, 66.6% of patients in the control group developed first-degree pressure injury and 26.7% developed second-degree pressure injury, whereas only 10.0% of patients in the intervention group developed first-degree pressure injury and none developed second-degree pressure injury.

DISCUSSION

According to a study that looked at patients in an intensive care unit in Australia every week for a year, nasogastric and endotracheal tubes were the devices most commonly linked to injuries (Dirgar *et al*., 2024). Patients in life-threatening states are at elevated risk for pressure injuries (PIs) brought on by medical devices. Compared to other forms of pressure injuries, medical equipment is thought to be responsible for more than 30% of these injuries. Pressure injuries linked with Endotracheal Tubes (ETT) were 90% common, according to a study done in Egypt, and pressure injuries related to NGT were 77.8% common (Sayed *et al*., 2022). Hospital-Acquired Pressure Injuries (HAPIs) are an increasing concern for healthcare systems because of the financial strain they place on healthcare facilities as well as the effects they have on patient well-being. An average of 60±5 HAPI occurrences per month were reported by Hamad Medical Corporation (HMC) during 2020 and 2021, with medical equipment accounting for around half of these cases (Melhem *et al*., 2025).

In this study, it was shown that nearly every patient in the intervention group did not have any stage NGT pressure injury, but more than half in the control group had first-degree NGT pressure injury at fourteen days, with a statistically significant difference (*p*-value 0.001). This study was strengthened by the findings of Zakaria *et al*. (2018), which noted that the majority of patients in the study group did not have any stage NGT pressure injury, but nearly half in the control group had first-degree NGT pressure injury at fourteen days, with a statistically significant difference (*p*-value 0.018). It was also supported by Sayed *et al*. (2022), who noted that half of the control group had first-degree nasogastric tube pressure injury after two weeks, with statistically significant differences between both groups (*p*-value 0.000). The lower incidence of nasogastric tube-related pressure injuries observed in the intervention group may be associated with the structured nursing care guidelines applied during the study period. As regards age, the present findings revealed that more than one third of patients were aged between 18 and 30 years. This finding was supported by Kebede *et al*. (2024), who found that below half of patients were between eighteen and thirty years. However, this was in opposition to Coyer *et al*. (2020), who noted that most patients were aged fifty-seven. It also disagrees with Juneja *et al*. (2024), who reported that the majority of patients were above sixty years.

In addition, there was no statistically significant variation between the intervention group and the control group. This study was compatible with Hsu *et al*. (2022), who discovered that the intervention group and control group did not differ statistically significantly. Also, this finding was in line with the study done by Dirgar *et al*. (2024), who documented that there was no statistical significance between the two groups. From the researcher's point of view, variation in demographic distributions across different settings may influence generalizability. Considering the findings of this particular study, males made up the majority of the patients studied. This result was in harmony with Indraswari *et al*. (2024), who stated that higher proportions of the patients were male. On the other hand, this result differed from Asti *et al*. (2017), who reported that most of the patients were female.

Additionally, the intervention group and control group did not differ statistically significantly. This result was in accordance with Hsu *et al*. (2022), who revealed no statistically significant difference between the intervention group and control group. However, this finding was in conflict with research by Coyer *et al*. (2020), who showed the two groups' differences were statistically significant. As for the APACHE II score, the study data detected that the intervention group did not differ statistically significantly from the control group. This study was in line with Sanaie *et al*. (2020), who established that there was no statistically significant difference between the two groups, and agreed with Abdelghafour *et al*. (2025), who observed that there was no statistically significant distinction between the groups. However, this result was in conflict with Zhang *et al*. (2021), who established that there was a statistically significant variance between the two groups.

According to complications, these findings documented that about a quarter of the control group had skin breakdown, with a statistically significant difference (*p*-value 0.004). Most patients in the intervention group at seven days did not have sinus inflammation, but most in the control group had sinus inflammation, with a statistically significant difference (*p*-value 0.001), respectively. This result aligned with Asti *et al*. (2017), who found that there was a statistically significant difference between both groups according to complication occurrence. Furthermore, it was in line with the study conducted by Duerksen *et al*. (2024), who evidenced that there was statistically significant difference between the studied and control groups. On the other hand, Sanaie *et al*. (2020), who pointed out that there was insufficient statistical significance between both groups, concurred

with this outcome.

In relation to length of ICU stay, the findings reported that there was statistical significance between the intervention and control groups (*p*-value 0.003). This study concurred with Wang *et al*. (2025), who documented that the variation between the experimental group and the control group was considered statistically significant. This study was also consistent with Lavoie *et al*. (2022), who found there was statistically significant difference between the two groups. Nonetheless, this result is contrary to Galetto *et al*. (2021), who revealed a non-statistically significant distinction between the control and intervention groups. According to the researcher's interpretation, prolonged hospitalization in the critical care unit may raise the risk of hospital-acquired pressure injuries.

Concerning the SOFA score on admission, the intervention group and the control group did not significantly differ from one another. This study matched Sanaie *et al*. (2020), who revealed that there was no statistical significance, and also concurred with Abdelghafour *et al*. (2025), who discovered that there was no statistically significant difference between the two groups on admission. On the other hand, this disagreed with Chauhan *et al*. (2021), who found that there was statistical significance between the two groups on admission. However, for the SOFA score at the middle length of stay and at discharge, there was significant variation (*p*-value 0.037) between the intervention and control groups. This result was consistent with Sanaie *et al*. (2020), who discovered that there was no noticeable difference between the two groups at the middle length of stay, although this was contrary to Gruyters *et al*. (2022), who noted that there was significant difference between the two groups at the middle length of stay.

Limitations

This study should be considered a pilot study, and the findings should be interpreted with caution. The applicability of the study findings is limited by the relatively small sample size, the use of a purposive sampling technique, and the single-center design. Additionally, the lack of geographical diversity may limit applicability to other healthcare settings. So further studies of larger sample sizes are recommended to confirm these results. The non-randomized quasi-experimental design limits the ability to establish causal relationships between the intervention and outcomes. Although statistically significant differences were observed, the findings should be interpreted as associations rather than definitive evidence of effectiveness.

Future Scope

Future research may also examine the long-term outcomes of guideline implementation, nurses' adherence over time, and the integration of such guidelines into institutional policies and standard nursing protocols. Continued research in this area will contribute to strengthening nursing practices for the prevention of nasogastric tube–related pressure injuries.

CONCLUSION

The findings of this study support the value of nursing interventions in minimizing NGT-related pressure injuries and promoting patient safety within hospital settings. It provides preliminary evidence that nursing care guidelines can support early prevention, reduce the risk of pressure injuries, and improve patient comfort. These findings are relevant to clinical nursing practice, as they emphasize the role of nurses in routine assessment, preventive care, and adherence to guidelines. The study also offers practical implications for nursing education and quality improvement initiatives aimed at enhancing patient safety. These findings warrant further investigation through larger, randomized, and multi-center studies to improve generalizability. The implementation of nursing care guidelines for NGT management can substantially enhance the quality of nursing care, improve patient outcomes, and reduce hospital-acquired pressure injuries. The findings indicate a significant association between structured nursing care guidelines and lower rates of NGT-related pressure injuries. However, due to the non-randomized quasi-experimental pilot design, conclusions regarding causality should be interpreted cautiously. Randomized controlled trials with larger, multi-center samples are needed to confirm these findings and establish causal relationships.

CRediT Authorship Contribution Statement

F.S.A.E: Conceptualization, Methodology, Writing – Original Draft. M.A.M: Data Curation, Formal

Analysis, Visualization. A.A.M: Data Curation, Visualization.

All authors contributed to data analysis, participated in drafting and revising the manuscript, approved the final version for publication, and agreed to be accountable for all aspects of the work.

AI Assistance Declaration

The authors declare that generative AI tools (ChatGPT and Microsoft Copilot) were used only for language enhancement and grammar correction during the preparation of this manuscript. The authors have carefully reviewed and revised the content and taken full responsibility for the final version of the manuscript.

Conflict of Interest

The authors declare that they have no conflicting interest.

ACKNOWLEDGEMENT

The authors would like to express gratitude to all the participants for their time and active response and supporting for the idea of the research.

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