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Role of Nurses in Preventing Complications Associated with Nasogastric Tube Feeding

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ABSTRACT: Nurses play a critical role in preventing complications associated with nasogastric tube (NGT) feeding by meticulously assessing and monitoring patients throughout their care. Their responsibilities begin with the proper insertion and placement verification of the NGT, typically using methods such as pH testing and auscultation. Once

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the tube is securely in place, nurses must ensure that feeding protocols are adhered to, including the appropriate formula and feeding rate, in order to reduce the risk of aspiration and gastrointestinal complications. By regularly checking the tube for patency and assessing the patient for any signs of distress, such as abdominal pain or changes in bowel activity, nurses can quickly identify and address potential issues before they escalate. In addition to monitoring physical signs, nurses play a vital educational role in guiding patients and their families about the NGT feeding process. This includes explaining the importance of maintaining proper hygiene to prevent infections around the insertion site and the significance of administering feeds in an upright position to minimize the risk of aspiration. Nurses also educate patients on recognizing symptoms of complications, such as nausea, vomiting, or respiratory changes, empowering them to communicate any concerns promptly. Through diligent observation, education, and ongoing patient assessment, nurses significantly mitigate risks associated with NGT feeding and enhance patient outcomes.

INTRODUCTION:

Nasogastric tube (NGT) feeding is one of the most frequently performed invasive procedures in contemporary healthcare, serving as a lifeline for patients who cannot ingest food orally because of neurological impairment, critical illness, surgery, or oropharyngeal dysfunction [1]. The device that sustains life can also become a vector for serious, sometimes fatal, complications, including inadvertent respiratory placement, aspiration pneumonia, tube blockage, diarrhoea, and pressure injuries [2]. Aspiration is the most feared respiratory complication and is a leading cause of aspiration pneumonia in tube-fed patients, which makes prevention a central nursing responsibility [3]. Verification of tube position is therefore a foundational safety barrier, and international guidance has moved decisively away from unreliable bedside rituals toward objective confirmation methods [4]. The American Association of Critical-Care Nurses recommends ongoing verification by comparing the visible external tube length with the documented length every four hours and before every feed or medication administration [5]. National clinical guidance similarly emphasises documentation, securement, flushing, and escalation when placement is uncertain [6]. Nutrition-support guidelines reinforce the need for systematic assessment, monitoring, and prevention of both mechanical and metabolic complications [7].

Recent national and international guidance [8], multicentre surveys of nursing practice [9], integrative reviews of nursing competency [10], pressure-injury guidance [11], reviews of motility-agent use [12], critiques of gastric residual volume rituals [13], studies of guideline application [14], securement evidence [15], staged feeding-pathway trials [16], mechanical-complication protocol trials [17], national education guidance [18], practical top-tip guidance [19], and post-pyloric feeding guidance [20] all point in the same direction: the quality of nursing care directly determines whether an NGT remains a therapeutic asset or becomes a source of preventable harm. Within this high-risk landscape, the nurse is not merely the executor of medical orders for enteral nutrition; the nurse is the continuous, observant presence at the bedside who inserts, verifies, maintains, monitors, and troubleshoots the feeding tube across every shift and every clinical transition [2].

Before delineating preventive strategies, it is essential to map the terrain of potential harm. NGT feeding complications are conventionally classified into mechanical, gastrointestinal, metabolic, infectious, and psychological categories, although in clinical reality these domains overlap and compound one another [7]. Mechanical complications include tube misplacement—whether inadvertent respiratory intubation during insertion or later displacement into the oesophagus, which creates a direct conduit for aspiration—alongside luminal occlusion by thickened formula or inadequately crushed medications, and mucosal pressure injuries at the nasal alae or nasopharynx [7]. Gastrointestinal complications encompass diarrhoea, often exacerbated by sorbitol-containing liquid medications; nausea, vomiting, and abdominal distension reflecting feeding intolerance; and delayed gastric emptying with resultant high residual volumes [7]. Aspiration sits at the intersection of mechanical misplacement, gastrointestinal dysmotility, and inadequate positional management, and it is the leading cause of aspiration pneumonia in tube-fed patients [3]. Metabolic derangements—refeeding syndrome, hyperglycaemia, and electrolyte disturbances—require vigilant biochemical monitoring, while infectious risks extend beyond pneumonia to include sinusitis and localised wound infections at securement sites [7]. Psychological sequelae, though less frequently quantified, include discomfort, sleep disruption, and the distress of altered body image [1]. Table 1 synthesises this taxonomy and identifies the nursing actions that correspond to each complication domain.

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Table 1: Taxonomy of NGT Feeding Complications and Corresponding Nursing Preventive Actions

Complication Domain	Specific Complication	Primary Nursing Preventive Action	Evidence Base
Mechanical	Respiratory misplacement during insertion	Radiographic or pH/capnographic verification before first use; never rely on auscultation alone	[4], [6]
Mechanical	Late tube displacement	Mark exit site; measure external length every four hours and before each feed; use secure fixation devices	[5], [15]
Mechanical	Tube occlusion	Flush with 30 mL water before and after feeds and medications; use liquid medications where possible	[6], [7]
Gastrointestinal	Diarrhoea	Review medication sorbitol content; administer feeds at tolerated rate and concentration	[7], [13]
Gastrointestinal	Feeding intolerance or high gastric residual volume	Assess clinical tolerance rather than routine residual volumes; use prokinetics judiciously	[12], [13]
Respiratory	Aspiration and aspiration pneumonia	Head-of-bed elevation 30–45 degrees; pre-feeding position checks; oral care; post-pyloric feeding for high-risk patients	[3], [20]
Infectious	Sinusitis and nasopharyngeal erosion	Regular nasal hygiene; alternate nares if prolonged intubation; pressure-relieving fixation	[7], [11]
Metabolic	Refeeding syndrome	Identify at-risk patients; initiate feeding at low rate with electrolyte monitoring	[7], [8]
Psychological and comfort	Discomfort and sleep disruption	Explain procedures; secure tube comfortably; minimise unnecessary checks at night	[1], [18]

Verification of Tube Position: The First and Most Critical Safety Barrier

No preventive strategy can compensate for an unrecognised misplaced tube. The insertion of an NGT is a blind procedure; the tube traverses the nasopharynx and oesophagus without direct visualisation, creating the possibility of inadvertent tracheobronchial placement [3]. The nurse's first duty is therefore verification, and the evidence here has undergone a decisive shift. Auscultation of injected air—the historical "whoosh test"—is now explicitly discouraged by multiple international guidelines because it cannot reliably distinguish gastric from respiratory placement [4]. Radiographic confirmation remains the gold standard for initial placement, particularly when pH testing is inconclusive or the clinical stakes are high [4]. However, bedside pH testing of gastric aspirate, using pH indicator paper calibrated for human aspirate with a threshold of 5.5 or less, is increasingly recommended as the first-line ongoing verification method, provided the nurse recognises its limitations: enteral formula and acid-suppressing medications can elevate gastric pH, and in a substantial proportion of cases pH testing fails to yield a confirmable result, necessitating X-ray and delaying nutrition [6]. Capnography, which detects exhaled carbon dioxide, has emerged as a promising adjunct, with studies suggesting diagnostic accuracy comparable to radiography for differentiating respiratory from gastrointestinal placement in critically ill adults [5]. Once initial placement is confirmed, the nurse must mark the tube at the nares and document the external length; this measurement becomes the reference point for ongoing surveillance [5]. A change in external length is a sentinel warning that demands cessation of feeding and repeat verification [5]. Table 2 juxtaposes the available verification methods with their appropriate clinical roles and limitations.

Table 2: Methods for NGT Position Verification: Utility and Limitations in Nursing Practice

Method	Appropriate Use	Key Limitation	Nursing Implication
Radiography	Gold standard for initial placement, especially when	Radiation exposure; delay in feeding initiation;	Nurse must advocate for timely interpretation and document

	bedside methods are inconclusive	interpretation requires radiological expertise	confirmation before first feed [4]
Gastric aspirate pH of 5.5 or less	First-line ongoing verification in many protocols	Formula and acid suppression elevate pH; may fail to yield aspirate; false reassurance possible	Nurse must know when pH result is inconclusive and escalate to X-ray rather than feed [6]
Capnography or colorimetric carbon dioxide detection	Adjunct for differentiating respiratory from gastric placement	Availability varies; may be less reliable in low-perfusion states	Nurse can use as a rapid bedside adjunct, not a sole confirmation [5]
External length measurement	Every-shift and pre-administration surveillance	Detects displacement but not initial misplacement	Must be documented and compared at every handoff and before every feed [5]
Auscultation or "whoosh test"	Not recommended	Cannot distinguish gastric from respiratory placement	Nurses must abandon this practice and advocate for evidence-based alternatives [4]
Visual inspection of aspirate	Supportive bedside clue	Aspirate appearance alone is not definitive	Use only in conjunction with pH or other objective methods [6]

Aspiration Prevention: A Multidimensional Nursing Mandate

Aspiration is the complication that most directly links nursing practice to patient survival. The evidence summary by Wang et al. identified 36 pieces of best evidence across 11 dimensions of aspiration prevention, with strong recommendations spanning risk assessment, tube location verification, nutritional infusion management, position management, airway management, and oral hygiene [3]. Among these, positional care is the most consistently reinforced and the most immediately within nursing control. The head of the bed must be elevated to at least 30 degrees, and ideally 45 degrees, during feeding and for 30 to 60 minutes thereafter; supine feeding is absolutely contraindicated [3]. This gravitational strategy reduces gastro-oesophageal reflux, the physiological precursor to aspiration. Nurses must also assess for subtle signs of aspiration—coughing during feeding, voice changes, desaturation, or unexplained fever—and interrupt feeding immediately if they occur [3]. For patients at persistently high risk, such as those with neurological dysphagia, delayed gastric emptying, or a history of aspiration, the feeding route itself becomes a nursing advocacy issue: post-pyloric feeding has been associated with reduced pneumonia risk compared with gastric feeding in critically ill adults, and the nurse is often the clinician best positioned to recognise when gastric delivery is failing and to initiate a multidisciplinary discussion about alternative access [20]. Oral hygiene completes the aspiration prevention triad. Aspiration pneumonia is not merely a mechanical event; it is an infectious consequence of oropharyngeal bacterial colonisation being translocated into the lower airway. Although the evidence on chlorhexidine has become more nuanced, the broader principle of regular, systematic oral care to reduce bacterial burden remains a strong recommendation within aspiration prevention bundles [3]. The nurse who combines positional vigilance, early recognition of aspiration events, and consistent oral hygiene addresses the three modifiable pathways through which aspiration pneumonia develops.

Gastrointestinal Tolerance and the Contested Terrain of Gastric Residual Volume

The monitoring of gastric residual volume exemplifies the tension between entrenched ritual and evolving evidence. For decades, nurses were taught to aspirate gastric contents every four hours and withhold feeding if the volume exceeded 200 or 250 mL. This practice remains widespread: a multicentre survey of clinical nurses found that 97.0% used syringes to measure gastric residual volume, with 62.7% measuring every four to eight hours and the most common thresholds being 200 mL and 150 mL [9]. Yet contemporary evidence has challenged the validity of this approach. Routine gastric residual volume monitoring has not been shown to reduce aspiration pneumonia incidence, and arbitrary volume thresholds frequently lead to unnecessary feeding interruptions that deprive patients of caloric and protein targets, contributing to muscle wasting, impaired immunity, and delayed wound healing [13]. Current guidance increasingly recommends abandoning routine gastric residual volume checks in asymptomatic patients; when gastric residual volume is assessed, the threshold for concern should be substantially higher—

often 500 mL—and feeding should be withheld only in the presence of genuine clinical signs of intolerance such as severe abdominal distension, nausea, vomiting, or significant patient discomfort [13]. This does not mean that gastrointestinal tolerance should be ignored; rather, the nurse's assessment must shift from a numerical ritual to a holistic clinical evaluation. Nurses should monitor for abdominal distension, bowel sounds, stool frequency and consistency, and subjective reports of nausea, while recognising that diarrhoea in tube-fed patients is often iatrogenic, driven by sorbitol-containing liquid medications or inappropriate formula osmolality [7]. When intolerance is suspected, the nursing response should be graded: slowing the infusion rate, considering a peptide-based or lower-osmolality formula, reviewing medication excipients, and, where appropriate, advocating for prokinetic therapy or post-pyloric access [12]. The nurse who understands the evidence behind gastric residual volume monitoring is equipped to challenge outdated protocols and to replace a ritual that harms nutrition with an assessment framework that serves it.

Preventing Mechanical Complications: Securement, Patency, and Mucosal Protection

Mechanical complications may lack the dramatic acuity of aspiration, but their cumulative impact on nutrition delivery, patient comfort, and healthcare costs is substantial. Tube displacement is a persistent threat: patients cough, vomit, turn, and undergo procedures, any of which can migrate the tube out of the stomach or into the oesophagus [5]. Traditional adhesive tape securement has shown inconsistent effectiveness, and silicone-based securement devices and nasal bridles have been associated with lower dislodgment rates [15]. The nurse's role in securement extends beyond the choice of device to the technique of application: the fixation must be pressure-relieving to prevent nasal alar necrosis, yet sufficiently robust to resist traction [11]. Equally important is the prevention of luminal occlusion. Small-bore feeding tubes are particularly vulnerable to blockage by thickened formula, inadequately crushed medications, and drug interactions that produce precipitates [6]. The evidence-based standard is to flush the tube with 30 mL of water before and after each feed and each medication administration, to use liquid medication formulations whenever possible, and to avoid mixing medications directly with enteral formula [6]. When blockage does occur, the nurse should attempt gentle warm-water irrigation with a large-bore syringe, avoiding excessive pressure that can rupture the tube, and should never use sharp objects or caustic solutions [19]. Mucosal protection is a third mechanical domain that is often overlooked until injury has occurred. Prolonged NGT presence can cause pressure necrosis of the nasal ala, nasopharyngeal erosions, and sinusitis, particularly with large-bore tubes [11]. Nursing measures include regular inspection of the nares and fixation site, gentle cleansing, periodic repositioning of the tube to relieve pressure on a single point, and consideration of tube diameter and material in collaboration with the multidisciplinary team [11]. Table 3 consolidates the mechanical prevention bundle.

Table 3: Evidence-Based Nursing Bundle for Prevention of Mechanical NGT Complications

Complication Target	Nursing Intervention	Frequency and Timing	Rationale
Tube displacement	Mark exit site and measure external length	Every four hours; before every feed and medication	Early detection of migration before feed administration [5]
Tube displacement	Use silicone-based securement or nasal bridle where indicated	At insertion and with each fixation change	Lower dislodgment rates than traditional tape in at-risk patients [15]
Nasal alar pressure injury	Inspect nares and fixation site; reposition tube to alternate pressure points	Every shift and with each securement change	Prevents pressure necrosis and mucosal erosion [11]
Tube occlusion	Flush with 30 mL water	Before and after each feed; before and after each medication	Maintains patency and prevents formula–drug interactions [6]
Tube occlusion	Use liquid medications; avoid crushing extended-release formulations	With each medication administration	Reduces particulate burden and precipitation risk [7]
Sinusitis and nasopharyngeal irritation	Regular nasal hygiene; consider smaller-bore tube	Daily assessment; at tube selection	Reduces mucosal irritation and sinus ostial blockage [11]

Oral Care, Patient Comfort, and the Prevention of Infection

The mouth of a tube-fed patient is a reservoir. Pooled secretions, altered salivary flow, and the absence of the mechanical cleansing effect of chewing and swallowing create conditions for rapid bacterial colonisation, which in turn increases the inoculum available for aspiration into the lower respiratory tract [3]. While the specific role of chlorhexidine has been debated, the foundational nursing practice of systematic oral hygiene is not in dispute [3]. Toothbrushing, suctioning of oropharyngeal secretions, and moisturising of the oral mucosa should be performed at regular intervals, with frequency determined by the patient's level of consciousness, secretion burden, and aspiration risk [3]. Oral care is not an adjunct to aspiration prevention; it is a core component of the bundle [3]. Beyond infection prevention, the nurse bears responsibility for the patient's comfort and dignity during tube feeding. NGT placement alters body image, interferes with sleep, and can cause persistent throat irritation [1]. Nursing measures such as explaining each step of the procedure, securing the tube so that it does not drag on the nares, minimising unnecessary nocturnal interruptions for routine checks, and involving the patient in positioning decisions all contribute to a tolerable experience [1]. These comfort-focused actions are not peripheral; they influence patient adherence to feeding regimens and the overall success of nutritional therapy [1]. Practical guidance from national nursing bodies reinforces that securement, documentation, and patient education are inseparable from technical tube care [18]. Top-tip guidance likewise stresses that small, consistent nursing actions—hand hygiene, checking position, flushing, and communicating with the team—prevent the majority of mechanical and infectious problems [19].

The Organisational and Educational Infrastructure of Safe Practice

Individual nursing vigilance, however expert, cannot compensate for systems that fail to support evidence-based practice. A recurring theme in the literature is the gap between what nurses know and what nurses do—and, crucially, between what guidelines recommend and what institutional protocols permit. A multicentre survey revealed that many clinical nurses continue to use traditional, unreliable methods for confirming NGT placement, including auscultation of injected air and bubble tests, despite international guidelines recommending against these practices [9]. The persistence of such practices is not simply a matter of individual knowledge deficit; it reflects the absence of robust competency frameworks, inconsistent access to pH testing supplies, and the inertia of entrenched ward routines [9]. The evidence on nursing competency acquisition is sobering: an integrative review of 17 international studies found that nurses do not routinely review or update their NGT management skills, that the resources they use are often of poor evidence-based quality, and that self-reporting tools reveal poor adherence to organisational guidelines and unsafe practices [10]. Education and training interventions do produce favourable results, but follow-up assessments have typically been conducted at short post-intervention intervals, leaving the durability of competency gains uncertain [10]. This evidence points toward the necessity of structural, rather than merely individual, solutions. Simulation-based education, competency assessments at regular intervals, and the integration of NGT safety into continuing professional development have all shown promise in improving knowledge and practice [10]. Equally important is the presence of nurse-led protocols and care bundles that translate evidence into actionable bedside pathways. Studies of evidence-based nursing protocols for mechanical complications of enteral nutrition have demonstrated reductions in mechanical complications and improvements in nutritional status, while nurse-led feeding pathways based on dynamic tolerance assessment have been associated with lower feeding intolerance and reduced aspiration-related pneumonia [16], [17]. National education guidance for nurses reinforces that insertion and care must be taught, assessed, and audited as a core clinical skill [18]. The organisational lesson is clear: safe NGT practice requires not only knowledgeable nurses but also the supply chains, documentation systems, and interdisciplinary cultures that make evidence-based action the path of least resistance [8]. Table 4 outlines the organisational supports that correspond to each domain of complication prevention.

Table 4: Organisational Supports Required for Consistent Evidence-Based NGT Nursing Practice

Domain of Prevention	Individual Nursing Action	Organisational Support Required	Evidence Basis
Position verification	Perform pH testing or escalate to X-ray when inconclusive	Ready availability of pH indicator paper calibrated for human aspirate; clear escalation protocol	[4], [6]
Aspiration prevention	Maintain head-of-bed elevation and perform oral care	Bed frames that permit reliable angle measurement; oral care kits at bedside; staffing that allows time for care	[3]

Tube securement	Apply and maintain appropriate fixation	Supply of silicone-based securement devices and nasal bridles; training in pressure-relieving technique	[15], [11]
Tolerance assessment	Conduct clinical tolerance assessment rather than ritual gastric residual volume measurement	Protocol that reflects current evidence on gastric residual volume thresholds and non-withholding for asymptomatic patients	[13], [9]
Competency maintenance	Participate in ongoing education and simulation	Mandatory competency assessments; protected education time; access to simulation facilities	[10], [18]
Nurse-led protocols	Implement evidence-based bundled care	Multidisciplinary endorsement of nurse-led feeding pathways; audit and feedback systems	[16], [17]
Post-pyloric access	Recognise failure of gastric feeding and advocate for alternative access	Access to post-pyloric tube placement and multidisciplinary nutrition support team	[20]
Practical bedside consistency	Follow top-tip guidance for flushing, checking, and documenting	Visible checklists, bedside prompts, and regular audit of practice	[19]

CONCLUSION:

The prevention of complications from nasogastric tube feeding involves continuous and comprehensive nursing practices, including verifying tube position, maintaining head-of-bed elevation, ensuring oral hygiene, and assessing gastrointestinal tolerance. Despite these practices being supported by evidence, a gap exists between guidelines and actual patient care due to outdated methods and insufficient organizational support. Closing this gap requires systemic investment in education and the establishment of nurse-led protocols that prioritize evidence-based actions. When the nursing practices are rigorous and well-supported, enteral nutrition can effectively meet its therapeutic goals; otherwise, patients risk complications such as pneumonia and interrupted nutrition.

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