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Nursing Interventions for the Prevention of Aspiration in Hospitalized Patients with Dysphagia

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ABSTRACT: Aspiration in hospitalized patients with dysphagia poses a significant risk for complications such as pneumonia and malnutrition. Nurses play a crucial role in the prevention of aspiration through a combination of assessment, education, and

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intervention strategies. The initial step involves a thorough assessment of the patient's swallowing abilities, including the use of standardized screening tools to identify dysphagia severity. Nurses must also closely monitor patients during meals, ensuring they are in a proper upright position, typically at a 30 to 90-degree angle, to facilitate safe swallowing. Additionally, modifying diet consistency and texture—such as providing thickened liquids and soft foods—can significantly reduce the risk of aspiration. Education is another key aspect of nursing interventions in managing patients with dysphagia. Nurses should educate both patients and their families about the importance of following dietary modifications and swallowing techniques. Demonstrating proper feeding techniques, such as offering small bites and encouraging slow eating, can further enhance safety during meals. It is also essential to create an environment conducive to eating, minimizing distractions and allowing adequate time for meals. Regular interdisciplinary communication with speech-language pathologists and dietitians is vital for ongoing assessment and adjustment of care plans tailored to individual patient needs.

INTRODUCTION

Dysphagia, or difficulty in swallowing, is a highly prevalent and clinically significant condition among hospitalized patients, particularly those with neurological disorders, critical illness, and advanced age. Oropharyngeal dysphagia occurs in more than 80% of patients requiring tracheostomy and in over 50% of those with prolonged endotracheal intubation, and it is independently associated with aspiration, aspiration pneumonia, dehydration, malnutrition, prolonged length of stay, and increased mortality [1]. Aspiration—the entry of oropharyngeal or gastric contents into the larynx and lower respiratory tract—represents the most feared consequence of dysphagia, and aspiration pneumonia remains a leading cause of hospital-acquired infection and death in this population [1]. Nurses are at the frontline of aspiration prevention. They are responsible for dysphagia screening, oral and airway care, safe feeding precautions, respiratory monitoring, and the implementation of aspiration-prevention bundles [2,3].

Dysphagia in the hospital setting is multifactorial. Neurological insults such as stroke, traumatic brain injury, Parkinson's disease, and multiple sclerosis disrupt the coordinated sensorimotor sequence of swallowing. Critical illness and mechanical ventilation contribute through acquired weakness, decreased upper airway sensation, secretion burden, laryngeal pathology, and biomechanical changes in the aerodigestive tract [3]. Older adults are disproportionately affected because of age-related sarcopenia of swallowing musculature, polypharmacy, cognitive impairment, and comorbidities such as chronic obstructive pulmonary disease and dementia [2,4]. Aspiration may be overt, presenting with coughing or choking during meals, or silent, occurring without any observable signs and therefore escaping detection unless active surveillance is undertaken [3]. The clinical and economic burden of aspiration pneumonia is substantial. It is associated with high morbidity and mortality, prolonged hospitalization, increased healthcare costs, and frequent readmissions [1]. Prevention therefore must be proactive, systematic, and nurse-driven. The evidence base supports the use of aspiration prevention bundles that combine multiple interventions—oral hygiene, bed positioning, dysphagia management, mobilization, nasal hygiene, sedation restriction, and incentive spirometry—although the optimal combination of components remains an area of ongoing investigation [1,2]. In patients with chronic obstructive pulmonary disease and other chronic respiratory conditions, risk factors such as impaired cough, secretion retention, reflux, and repeated hospitalization further amplify aspiration risk and require holistic nursing care planning [4].

Nurse-Led Dysphagia Screening and Risk Assessment

Early identification of dysphagia and aspiration risk is the cornerstone of prevention. Nurses are uniquely positioned to perform initial screening at the bedside because they are present continuously and can observe swallowing during meals, medication administration, and routine care [5]. Guidelines for non-ventilated hospitalized patients support the use of an aspiration screening tool early for all adult inpatients, although no single tool is universally recommended [1]. Commonly used nurse-administered tools include the Eating Assessment Tool-10 (EAT-10), the Yale Swallow Protocol, the Modified Water Swallow Test, and the Drooling Severity and Frequency Scale [5,6]. A nurse-led dysphagia screening protocol in general wards using EAT-10 followed by a bedside swallow evaluation has been shown to facilitate timely speech-language pathology referral and reduce hospital-acquired aspiration pneumonia [5]. A quality improvement project using a swallow evaluation tool to reduce

aspiration among acute stroke patients further demonstrated that structured nurse-led screening can improve adherence to aspiration precautions and timely referral [6]. In intensive care units, nurse-led screening is essential before and after extubation, and emerging tools such as cervical tracheal breath sound analysis and bedside cervical ultrasound are being investigated to help nurses detect silent aspiration and initiate aspiration-prevention protocols earlier [3]. Qualitative evidence from teaching hospitals shows that nurses' preventive practices for aspiration pneumonia are influenced by workload, knowledge, availability of protocols, and interdisciplinary support, highlighting the need for organizational commitment and continuing education [7]. Risk assessment should be structured and documented. A standardized evidence-based nursing management framework for hospitalized older adults identifies high-risk factors including advanced age (>70 years), mechanical ventilation, dysphagia, impaired consciousness, supine position, head-of-bed elevation below 30°, persistent hiccups, nausea and vomiting, impaired sphincter function, neurological or psychiatric disorders, and the use of sedatives or muscle relaxants [2]. Nurses should use validated checklists to identify these risks through interviews, observation, and testing, and should document findings to ensure continuity of care across shifts [2,5]. Table 1 summarizes the major risk factors that nurses should systematically assess.

Table 1. Major Risk Factors for Aspiration in Hospitalized Patients with Dysphagia

Category	Risk Factors
Demographic and baseline	Advanced age (>70 years); frailty; sarcopenia; edentulous state
Neurological	Stroke; Parkinson's disease; dementia; traumatic brain injury; impaired consciousness; delirium
Critical illness and airway	Mechanical ventilation; tracheostomy; prolonged intubation; cuff pressure abnormalities; secretion burden
Swallowing-specific	Delayed swallow initiation; reduced tongue base retraction; pharyngeal weakness; silent aspiration; reduced cough effectiveness
Positional and feeding	Supine position; head-of-bed elevation <30°; feeding in reclined position; rapid feeding; large bolus size
Pharmacological	Sedatives; hypnotics; antipsychotics; opioids; muscle relaxants; medications that increase gastric reflux
Oral and nasal	Poor oral hygiene; periodontal disease; nasal colonization; dry mouth

Oral Care as a Core Nursing Intervention

Oral hygiene is one of the most powerful and cost-effective nursing interventions for preventing aspiration pneumonia. Aspiration of oropharyngeal secretions colonized with pathogenic bacteria is a primary mechanism in the pathogenesis of aspiration pneumonia, and reducing oral bacterial load directly attenuates this risk [8,10]. A systematic review of best evidence for post-stroke dysphagia patients recommends twice-daily oral care with a soft-bristled toothbrush, cautious use of chlorhexidine mouthwash, and systematic caregiver training before discharge [8]. The evidence supports nurse-led oral care protocols as part of dysphagia management, with studies demonstrating reductions in aspiration pneumonia when trained nurses deliver structured oral hygiene [8,10]. Oral care should be performed with the patient as upright as possible to prevent food or liquid from entering the lungs, and simple mouth care after each meal is important to remove food residue and reduce the risk of oral infections [8]. For patients at high risk of aspiration, a wet toothbrush with a very small amount of fluoride toothpaste may be sufficient, followed by wiping the oral cavity with a compress [8]. In mechanically ventilated patients, oral care must be integrated with airway management, including maintaining endotracheal cuff pressure at 25–30 cmH_2O and using subglottic suctioning as indicated [3,12]. Nurses should also attend to nasal hygiene, because the nasal cavity can serve as a reservoir for pathogens that may be aspirated into the lower respiratory tract [10]. Although evidence specific to nasal hygiene in dysphagia is still developing, best-practice recommendations include maintaining nasal moisture, avoiding forceful nose blowing, and performing nasal irrigation when clinically appropriate [10]. A pilot randomized controlled trial in acute ischemic stroke found that combining oral care with neuromuscular electrical stimulation, delivered by trained nurses, was feasible and was associated

with no cases of stroke-associated pneumonia in the intervention groups compared with a 33.3% incidence in the control group, although the study was not powered to detect statistically significant differences [9].

Positioning and Feeding Strategies

Positioning is a fundamental nursing intervention that uses gravity to facilitate safe swallowing and reduce aspiration risk. The head of the bed should be elevated to at least 30° to 45° during oral intake and for 30–60 minutes after feeding [11]. For patients with dysphagia, a high-Fowler's position of 60–90° is often preferred because it allows gravity to assist the passage of food and liquids and minimizes the risk of reflux and aspiration [11]. Patients should avoid slumping forward or extending the neck, as these postures can compromise airway protection [11]. When feeding patients with partial paralysis of the tongue, mouth, or throat, nurses should position the patient upright and as close to 90° as possible, holding the head to avoid hyperextension [11]. For patients receiving enteral nutrition, a semi-recumbent position of 30°–45° should be maintained during feeding and for at least 30 minutes afterward, and turning or suctioning should be avoided during this period [12]. Post-pyloric feeding should be considered for patients at high risk of aspiration [12]. Mealtime supervision is another critical nursing function. Nurses should assess alertness before feeding, pace the meal, monitor for signs of aspiration such as coughing or a wet voice, check for oral residue after swallowing, and ensure that the prescribed level of supervision is maintained [5,11]. Table 2 outlines the key positioning and feeding parameters that should be implemented and audited in clinical practice.

Table 2. Positioning and Feeding Parameters for Aspiration Prevention

Parameter	Recommendation
Head-of-bed elevation during oral intake	≥30°, preferably 60–90° (high-Fowler's)
Head-of-bed elevation after oral intake	Maintain for 30–60 minutes
Position during enteral feeding	Semi-recumbent 30°–45°
Position after enteral feeding	Maintain for ≥30 minutes; avoid turning or suctioning
Head and neck alignment	Avoid hyperextension; chin slightly tucked
Feeding supervision	Assess alertness; monitor for coughing, wet voice, and oral residue
Bolus size and pacing	Small bolus volumes; allow adequate time between swallows

Texture Modification and Thickened Liquids

Dietary texture modification is a cornerstone of dysphagia management. The International Dysphagia Diet Standardisation Initiative (IDDSI) provides a standardized framework for classifying food textures and liquid consistencies, enabling consistent communication among nurses, speech-language pathologists, dietitians, and food service staff [15]. Thickened liquids slow the velocity of the bolus through the pharynx, allowing more time for airway protection and thereby reducing aspiration risk [14]. A meta-analysis of randomized controlled trials found that thickened liquids were associated with a 41% reduction in aspiration risk compared with no thickened liquids (odds ratio 0.59), with benefits observed across stroke, mixed-etiology, and Parkinson's disease populations [14]. Both gum-based and starch-based thickeners demonstrated comparable effects [14]. However, thickened liquids are not without limitations. They can reduce palatability and fluid intake, and their effectiveness in preventing aspiration may diminish with increasing age [14]. A water protocol—allowing small amounts of water following oral care—has been shown to have a large, significant effect on improving fluid intake when combined with thickened liquids, and nurses play a key role in implementing and monitoring such protocols [14]. Texture-modified diets can also affect nutritional intake. A meta-analysis found small-to-medium effects on calorie and protein intake, underscoring the need for nurses to monitor nutritional status and collaborate with dietitians to optimize intake [13]. Stroke rehabilitation guidelines similarly emphasize individualized texture modification, regular reassessment of swallowing function, and multidisciplinary decision-making regarding diet and fluids [15]. Table 3 provides a simplified overview of IDDSI levels relevant to nursing practice.

Table 3. Simplified IDDSI Framework for Nursing Practice

IDDSI Level	Description	Nursing Considerations
Level 0	Thin liquids	Not appropriate for patients with established aspiration risk unless a water protocol is in place
Level 1	Slightly thick	May be suitable for mild dysphagia
Level 2	Mildly thick	Flows off a spoon; suitable for moderate dysphagia
Level 3	Moderately thick (liquidized)	Can be drunk from a cup; requires some tongue control
Level 4	Extremely thick (pureed)	Cannot be drunk; eaten with a spoon; requires careful oral control
Level 5	Minced and moist	Small, soft pieces; requires chewing ability
Level 6	Soft and bite-sized	Soft, tender pieces; requires chewing
Level 7	Regular	Normal textures; not appropriate for patients with dysphagia

Compensatory Swallowing Techniques

Compensatory techniques are behavioral strategies that nurses can prompt and supervise during meals to improve swallow safety without requiring intensive rehabilitation training. Postural techniques such as the chin-tuck maneuver widen the vallecular space and help protect the airway in patients with delayed swallow initiation or reduced tongue base retraction [16]. The effortful swallow increases tongue base retraction and pharyngeal constrictor contraction, improving bolus clearance [16]. The supraglottic swallow and super-supraglottic swallow are airway-protection maneuvers that involve voluntary breath-holding before and after the swallow, and the Mendelsohn maneuver prolongs laryngeal elevation to improve upper esophageal sphincter opening [16]. A systematic review and meta-analysis of behavioral interventions for oropharyngeal dysphagia found that most studies reported positive treatment outcomes for chin tuck, effortful swallow, the Mendelsohn maneuver, and the Shaker exercise, although the evidence base remains preliminary and heterogeneous [16]. The chin-tuck maneuver, in particular, showed a moderate positive effect in meta-analysis [16]. Nurses should receive training in these techniques and should prompt patients to use them during meals and medication administration [5,16]. Table 4 summarizes the most commonly used compensatory techniques and their proposed mechanisms.

Table 4. Compensatory Swallowing Techniques for Nursing Practice

Technique	Mechanism	Clinical Indication
Chin tuck	Widens vallecular space; narrows airway entrance	Delayed swallow initiation; reduced tongue base retraction
Effortful swallow	Increases tongue base retraction and pharyngeal contraction	Reduced pharyngeal clearance
Supraglottic swallow	Voluntary airway closure before and during swallow	Reduced laryngeal vestibule closure
Super-supraglottic swallow	More forceful airway closure	Severe airway protection deficits
Mendelsohn maneuver	Prolongs laryngeal elevation	Reduced upper esophageal sphincter opening
Multiple swallows	Clears residual material from the pharynx	Pharyngeal residue

Neuromuscular Electrical Stimulation and Adjunctive Therapies

Neuromuscular electrical stimulation (NMES) is a non-invasive adjunctive therapy that delivers low-intensity electrical currents to the swallowing musculature via surface electrodes, with the aim of improving muscle strength, facilitating cortical reorganization, and reducing disuse atrophy [18]. The evidence for NMES as a standalone intervention for aspiration prevention is mixed. A health technology assessment found insufficient evidence to recommend for or against NMES and pharyngeal electrical stimulation for dysphagia [18]. However, more recent studies have explored NMES in combination with oral care and swallowing exercises. A pilot randomized controlled trial in acute ischemic stroke found that combining oral care with NMES, delivered by trained nurses within 48 hours of stroke onset, was feasible and was associated with no cases of stroke-associated pneumonia in the intervention groups compared with a 33.3% incidence in the control group, although the study was not powered to detect statistically significant differences [17]. The intervention was protocolized and did not require active patient cooperation, suggesting potential applicability to patients with cognitive or functional limitations [17]. A network meta-analysis suggested that NMES combined with exercise and transcranial stimulation may be among the most effective combinations for reducing penetration-aspiration scores [18]. Nurses are well positioned to deliver NMES as part of a structured dysphagia care protocol, particularly in settings where speech-language pathology resources are limited, but adequate training and supervision are essential [17,18].

Medication Management and Sedation

Medication administration is a frequently overlooked source of aspiration risk in hospitalized patients with dysphagia. Solid oral dosage forms can be difficult to swallow, and improper administration techniques—such as giving a whole tablet with a large volume of thin liquid—can precipitate aspiration [19]. Nurses should complete a swallowing assessment before administering oral medications, determine the patient's safe bolus volume and appropriate liquid consistency, and avoid crushing sustained-release, controlled-release, or enteric-coated formulations unless explicitly approved by a pharmacist [19]. When necessary, medications may be given with soft food or thickened fluids, but only after confirming that the drug can be safely administered in this way [19]. Postural adjustments, such as a lean-forward technique for capsules, and the use of swallowing aids can further reduce administration risk [19]. Sedation is another critical modifiable risk factor. Sedatives, hypnotics, antipsychotics, opioids, and muscle relaxants can impair swallowing reflexes, reduce airway protection, and increase the risk of aspiration [2]. Nurses should advocate for minimizing sedation whenever clinically feasible, participate in medication reviews to identify drugs that increase reflux or impair swallowing, and assess the patient's level of sedation before administering food or oral medications [2,19]. Avoiding oral intake in patients with altered consciousness, somnolence, or agitation is a fundamental safety principle [2].

Mobilization and Respiratory Care

Early mobilization is an often-underappreciated nursing intervention in aspiration prevention. Immobility promotes secretion pooling, reduces cough effectiveness, and contributes to deconditioning of respiratory and swallowing musculature [21]. Nursing care related to oral hygiene, feeding, positioning, and mobilization can collectively reduce the risk of aspiration pneumonia in post-stroke patients [21]. Encouraging early mobilization during hospitalization helps maintain airway clearance and reduces the risk of pulmonary complications [21]. Respiratory muscle training, including diaphragmatic breathing and pursed-lip breathing, can improve cough strength and airway clearance, and nurses can guide patients in these exercises as part of routine care [21]. Incentive spirometry is a simple respiratory exercise that helps improve lung expansion, prevent mucus accumulation, and reduce the risk of pneumonia and atelectasis, and it has been included in hospital-acquired pneumonia prevention bundles for stroke survivors [20]. Nurses should ensure that patients who can perform incentive spirometry do so 5–10 times per hour while awake, and should document adherence and outcomes [20]. For mechanically ventilated patients, maintaining endotracheal cuff pressure at 25–30 cmH_2O, monitoring cuff pressure every 6 hours, and reassessing after suctioning, repositioning, or transport are essential respiratory care practices that reduce microaspiration [12].

Nurse-Led Protocols, Bundles, and Quality Improvement

The complexity of aspiration prevention demands a structured, protocol-driven approach. Aspiration prevention bundles that combine oral hygiene, bed positioning, dysphagia management, mobilization, nasal hygiene, sedation restriction, and incentive spirometry are supported by guidelines and systematic reviews, although the optimal combination of components remains uncertain [1,22]. The STOP ASP Aspiration Prevention bundle is an example of an evidence-based protocol tailored to postoperative patients, designed to address dysphagia, inappropriate positioning, and poor oral care through nurse education

and administrative monitoring [22]. Nurse-led screening linked to therapist referral has been associated with higher rates of oral feeding and lower pneumonia risk in adjusted analyses, and oral care protocols delivered by trained nurses as part of dysphagia management have reduced aspiration pneumonia [5,8]. Quality improvement projects have demonstrated that implementing standardized dysphagia care pathways, signage communicating dysphagia-related orders, and regular audits can reduce aspiration and pneumonia rates [23]. The evidence content for standardized prevention and management includes establishing institutional policies, forming multidisciplinary aspiration management teams, providing staff education and competency assessments, conducting early risk assessment, using validated scales, implementing graded interventions, assessing cough effectiveness, managing reflux and positioning, and monitoring cuff pressure [22,23]. Table 5 summarizes the core components of a nurse-led aspiration prevention bundle.

Table 5. Core Components of a Nurse-Led Aspiration Prevention Bundle

Domain	Key Nursing Actions
Screening and assessment	Perform admission dysphagia screening; use validated tools; document risk factors; reassess after clinical changes
Oral and nasal care	Provide twice-daily toothbrushing; suction secretions; maintain nasal hygiene; use chlorhexidine cautiously
Positioning	Elevate head of bed ≥30° during and after meals; maintain semi-recumbent position during enteral feeding
Feeding and texture	Follow IDDSI recommendations; supervise meals; monitor bolus size and pacing; implement water protocol when appropriate
Compensatory techniques	Prompt chin tuck, effortful swallow, and supraglottic swallow as prescribed
Medication management	Assess swallowing before oral administration; avoid crushing inappropriate formulations; review sedatives
Respiratory care	Encourage incentive spirometry; guide respiratory muscle training; monitor cuff pressure in ventilated patients
Mobilization	Promote early ambulation and out-of-bed activity as tolerated
Education and audit	Provide regular staff training; audit compliance with bundle elements; provide feedback

Education and Training for Nursing Staff

The effectiveness of any aspiration prevention protocol depends on the knowledge and competency of the nursing workforce. Studies have consistently identified gaps in nurses' knowledge of dysphagia management and aspiration prevention, with many nurses reporting no prior training in this area [7,24]. Healthcare institutions should establish continuous education and training programs centered on stroke care, dysphagia screening, aspiration precautions, oral care, and positioning [24]. Periodic refresher courses and simulation-based workshops are recommended to ensure sustained competency [24]. Innovative educational approaches, including outcome-based continuing education, immersive simulation, and augmented reality platforms, have been developed to enhance dysphagia education and help nurses plan and implement aspiration-prevention interventions more effectively [22,24]. Training should cover both theoretical knowledge and practical skills, and competency assessments should be conducted regularly [24]. Nurses also need training in the use of electronic order panels and clinical decision-support tools for dysphagia precautions, because health information technology can improve the visibility and implementation of aspiration precautions [6,24].

Multidisciplinary Collaboration

Although nurses are central to aspiration prevention, optimal outcomes require collaboration with speech-language pathologists, dietitians, physicians, pharmacists, respiratory therapists, and occupational therapists. Collaborative nurse–therapist dysphagia care, particularly early screening, prompt therapist involvement, oral care, and early swallowing therapy, has been consistently

associated with improved pneumonia-related and oral intake outcomes [24]. In intensive care units, nurses have an essential role in dysphagia screening and appropriate escalation to speech-language therapists and medical colleagues, and they are responsible for implementing interventions to mitigate dysphagia risks including oral and airway care, safe feeding precautions, and respiratory monitoring [3]. A multidisciplinary aspiration management team—including nurses, dietitians, rehabilitation therapists, and physicians—should be established to support clinical decision-making and ensure that prevention strategies are coordinated and evidence-based [22]. Nurses should also engage in shared decision-making with patients and families, providing education about dysphagia, aspiration risk, texture-modified diets, compensatory techniques, and the importance of oral care [8,24].

CONCLUSION

Aspiration prevention in hospitalized patients with dysphagia is a complex, multifaceted nursing responsibility that demands systematic assessment, consistent implementation of evidence-based interventions, and continuous quality improvement. Nurses are the healthcare professionals best positioned to identify dysphagia risk early, deliver oral care, ensure safe positioning and feeding, prompt compensatory swallowing techniques, manage medications and sedation judiciously, promote mobilization and respiratory health, and coordinate multidisciplinary care. The evidence supports a bundle approach that combines nurse-led screening, rigorous oral hygiene, head-of-bed elevation, texture modification, compensatory techniques, medication review, sedation minimization, respiratory care, and staff education. Adjunctive therapies such as neuromuscular electrical stimulation remain promising but require further high-quality research. Ultimately, the prevention of aspiration and aspiration pneumonia depends not on a single intervention but on the consistent, protocol-driven, and compassionate execution of multiple nursing interventions by a well-trained and well-supported nursing workforce.

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