

Perspectives

Recovery Strategies from the OR to Home

ABSTRACT

Catheter stabilization is an important intervention for increasing the dwell time and reducing the risk of complications associated with central vascular access devices (CVADs) and peripheral IV (PIV) catheters. Properly stabilized devices can preserve site integrity and improve patient satisfaction. While “stabilization” is often equated with applying a dressing and tape, the newly released Infusion Nurses Society Guidelines state that stabilization is best achieved with the use of a specifically designed device or system.

Nasal feeding tube dislodgement is reported to occur frequently in hospitalized patients, and the negative consequences of dislodgement are underestimated. Tube dislodgement poses significant health risks and increases the cost of care. Studies show that the rate of removal for nasogastric tubes due to unintentional dislodgement is 28.9% to 40%. This rate can be decreased dramatically by practicing “MARK” methods of preventing tube dislodgement and following five levels of strategies for tube securement.

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The 2011 Infusion Nursing Standards of Practice: Vascular Access Device Stabilization, Joint Stabilization, and Site Protection

By Lisa Gorski MS, HHCNS, BC, CRNI®, FAAN



In January 2011, the latest revisions to the Infusion Nurses Society (INS) Infusion Nursing Standards of Practice were published. The INS, recognized as the global authority on infusion nursing, sets the standards for infusion care and disseminates their standards of practice approximately every five years. The 2011 version consists of 68 standards.

This article discusses three related INS Standards: vascular access device (VAD) stabilization, joint stabilization, and site protection. Each of these standards shares the common goal of reducing the risk for inadvertent catheter dislodgement or complications associated with catheter movement, such as infiltration and phlebitis. Several other INS Standards cited throughout this article also support aspects of implementing VAD stabilization, joint stabilization, and site protection.

What's new in the way the standards are written

To understand and implement the standards, it helps to know how

and why they are written in their current form. Each standard consists of two parts: “standards” and associated “practice criteria.” The standards are broad statements applicable to all healthcare settings, while the practice criteria provide guidance for implementing the standards. The most important change in the 2011 version is the addition of an evidence rating scale for all criteria. The rating scale represents the strength of the body of evidence behind inclusion of each practice criterion.¹ A brief overview of the rating scale and its levels of evidence follows, as the levels have bearing on and provide context for the discussion of VAD stabilization and related standards.

Levels of evidence for ins standards

The INS Standards levels of evidence are rated from I to V, with I indicating the largest, strongest, most reliable body of clinical evidence available to support a practice criterion.¹ Level I evidence can include

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Enteral Tube Dislodgement: Prevention and Recognition

Lorraine Linford, RN, BS, CNSC and Carol McGinnis, MS, CNS, CNSN

The need to maintain gastrointestinal function and its subsequent protective mechanisms has been recognized as a very important step in the management of critically ill patients in the first 24 to 48 hours of admittance to a medical facility. Multiple studies have attributed decreased morbidity and increased survival rates to early enteral feedings.^{1,2} Guidelines established by the Society of Critical Care Medicine (SCCM) and the American Society for Parenteral and Enteral Nutrition (ASPEN) emphasize initiating enteral feedings as early as possible.² Collectively, these guidelines and clinical data have helped move clinicians into the realm of early feeding tube placement. Nasal enteral tube placement is generally performed at the bedside. Once the tube has been successfully placed, keeping it secured in an appropriate position can be a challenge for the bedside clinician, particularly as the patient moves beyond the acute care setting to recovery and rehabilitation.

Problem: nasal tube dislodgement

Nasal feeding tube dislodgement is reported to occur frequently in hospitalized patients, but few controlled studies exist that quantify its frequency and consequences. In the largest study of its kind,³ Mion et al. studied 49 intensive care units to determine rates of therapeutic device removal. The 14 devices tracked included nasogastric tubes. The 1,097 episodes of

device removal resulted in an overall prevalence of 22.1 therapeutic disruption episodes per 1,000 patient days. The rate of removal for nasogastric tubes was 28.9%.³ Several other authors have reported unintentional dislodgement rates of approximately 40% across patient populations receiving nasoenteral feeding tubes.^{4,5}

Accidental or unplanned removal of nasal feeding tubes occurs through three basic mechanisms:

- **Patient related**
The patient deliberately removes the tube or accidentally dislodges it during movement; e.g., during sleep.
- **Clinician related**
Inadvertent removal may occur during procedures. Also, the caregiver may take inadequate precautions and/or not maintain

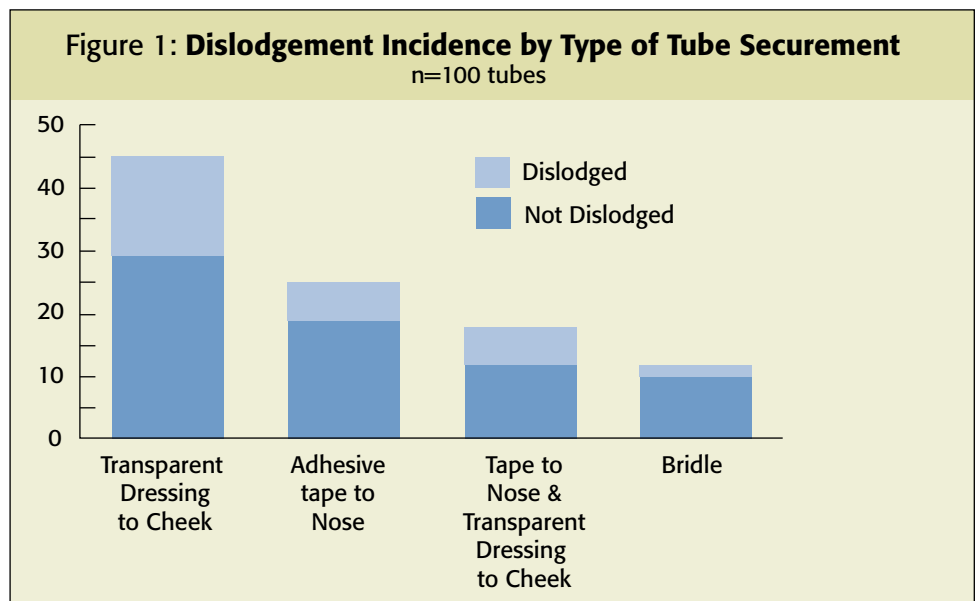
adequate securement of the tube.

- **Clinical course related**
Tube removal may be necessary due to clogging, or malpositioning or removal for procedures such as bronchoscopy, endoscopy, or extubation.

In 2011, Linford conducted a small prospective quality monitor at a tertiary academic Level 1 trauma center (unpublished data) to determine the rate of inadvertent removal or replacement in its nasoenteral tube population. Tube dislodgements for clinical procedures such as surgery or endoscopy were excluded from this report.

The monitor included 78 patients (mean age, 62 years; range, 21–96) who had nasoenteric tubes for receiving enteral nutrition therapy. The average dwell time was 6.6 days (range: < 24 hours to 42 days). Of the 100 feeding tubes placed in 78 patients, the dislodgement rate was 38%, similar to the rates reported in the literature. The most common cause of inadvertent tube removal was related to patient confusion (57%).

Current practice in this facility is to secure the feeding tube to the cheek with a transparent semi-permeable membrane dressing; some tubes



are also secured using adhesive tape to the nose. Placement of a nasal bridle is considered only for patients at high risk for tube removal.

Surveillance of tube removal by securement method indicated that tubes secured only to the cheek by a transparent dressing were inadvertently removed most frequently: 36% of the time. The greater the likelihood of tube dislodgement, the more securement escalated (see Figure 1), with the final step being placement of a nasal bridle.

Consequences of tube dislodgement

The consequences of tube dislodgement have immediate clinical impact and pose potential dangers to the patient. Significant morbidity and even mortality from malposition of small-bore nasoenteral feeding tubes continue to be reported in both critical- and acute-care patient populations.⁶ The increase in morbidity is more prevalent in confused or obtunded patients. The potential for aspiration may be greatest in patients in whom the tube is only partially displaced, particularly if this remains undetected over time, because the feeding can infuse into the pharynx or upper esophagus. Another patient consequence of feeding tube displacement is therapeutic disruption of nutrients, fluids, and medications until a newly placed tube's position is verified and instillation via the tube can be resumed. Interruption to nutrient delivery, particularly in critical care, may be associated with increased morbidity when tube displacement limits the potential positive benefits seen with early enteral feedings.²

More subjectively, additional concerns include patient discomfort and emotional frustration for patients and families surrounding delays in care and tube replacement. These consequences cannot be underestimated.

The consequences of tube dislodgement have immediate clinical impact and pose potential dangers to the patient.

Tube dislodgement affects not only care delivery, patient comfort, and overall satisfaction, but also the cost of care. Costs related to tube replacement, delay of other medical therapies, additional therapies that dislodgement may predicate, and increased length of stay are attributed to loss of enteral access. Decreases in clinician productivity while attempting to re-establish enteral access are not easily measured, but also have a significant impact.

Potential risks are underestimated

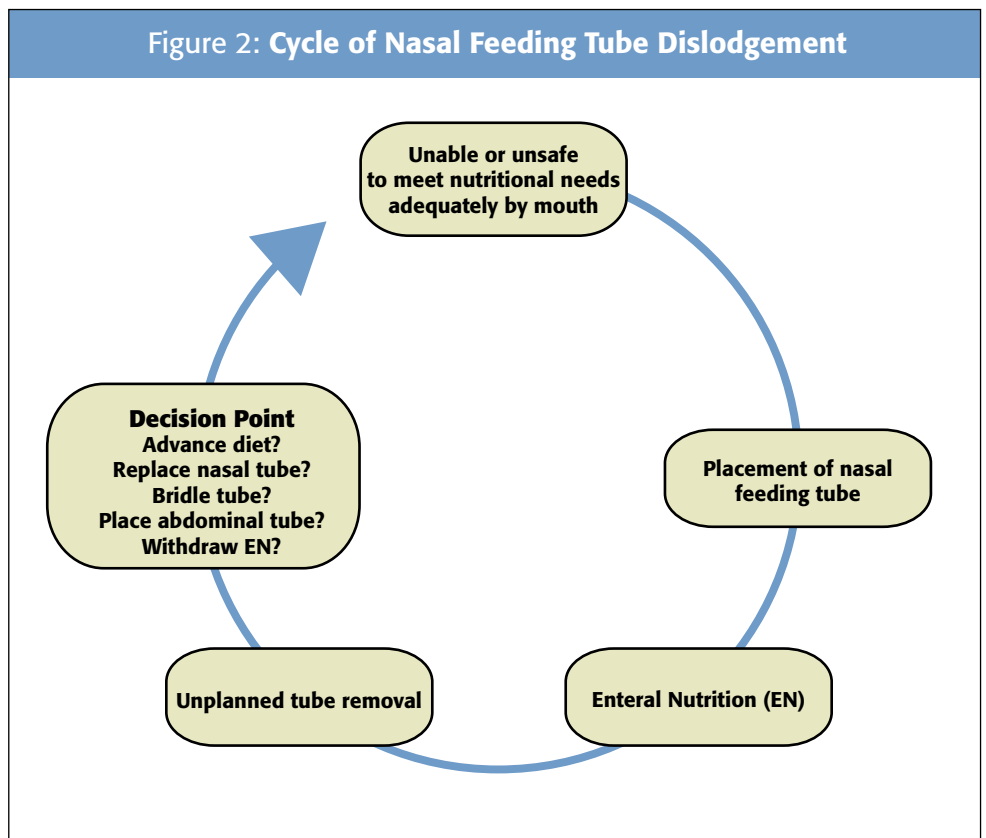
The potential risks of feeding tube placement are not always considered in the “routine” ordering of feeding tube replacement. Each time a nasal or an oral feeding tube is inserted, the patient is potentially at risk for epistaxis, aspiration, tracheobronchial placement and pneumothorax, or esophageal perforation. Other factors, including increased radiation exposure for placement confirmation and difficult insertions also increase risks, healthcare system costs, and the burden of care.

Not surprisingly, patient agitation, disorientation and restlessness, medication use, nosocomial infections, and a Glasgow Coma Scale score of 9 or greater have been associated with device removal in several studies.^{3,7}

Tube dislodgement cycle

According to Linford, tube dislodgement can be visualized as a cycle, with each tube dislodgement

Figure 2: Cycle of Nasal Feeding Tube Dislodgement



event precipitating a decision point regarding the level of therapy. (See Figure 2.) Can the patient safely resume oral intake at this point? If oral intake is not an option, will the tube be replaced? If replaced, would bridling be a good option for securing the tube? Should a longer-term percutaneous gastrostomy or other abdominal tube option be explored? The inadvertent removal of a feeding tube may lead to a sensitive discussion with the patient and/or family regarding desired level of care, particularly in view of a deteriorating clinical status or poor prognosis. Sometimes palliative care teams are consulted to assist in goal-setting dialogues such as this.

Tube securement methods: Five levels of strategies

After the tube has been placed safely and the tip location verified, the challenge is to keep the tube in place. Bedside nurses are in a key position to ensure that the tube position is securely maintained, enteral feedings are delivered without delay, and the potential adverse effects of tube displacement are averted.




Strategies to maintain feeding tubes in an appropriate position can be stratified by level of intervention (for patient benefit and securement benefit). (See Table 1.) To the authors' knowledge, no randomized trials have been conducted comparing different methods of nasal tube fixation.

Typical securement methods

Level 1: tape and/or dressings

The first defense against tube removal traditionally is to secure the tube to the nose or cheek.

The securement method described in Level 1 is the one most commonly used for tubes inserted via the nare or mouth, including nasogastric tubes used for suction. Tubes secured to

Table 1: Levels of Strategies for Tube Securement	
<p>Level 1 Tape on nose, cheek or some combination</p> <ul style="list-style-type: none"> Varies: from securement with various types of tape to semi-permeable transparent dressings 	 <p>*</p>
<p>Level 2 Manufactured fixation devices</p> <ul style="list-style-type: none"> Consists of a base of various adhesive bandage configurations placed across the nose; then the feeding tube is connected to the device by an attached clip or additional adhesive strips 	 <p>**</p>
<p>Level 3 Nasal tube retention device</p> <ul style="list-style-type: none"> Suture to nose (least preferred because of risk for infection due to disruption of skin integrity and patient discomfort) Bridle loop (see brief descriptions) 	 <p>*</p>
<p>Level 4</p> <ul style="list-style-type: none"> Chemical sedation and Physical restraints <p>Avoid both whenever possible due to compassionate care and regulatory restrictions.</p>	
<p>Level 5</p> <ul style="list-style-type: none"> Personnel employed to observe and prevent self-harm; i.e., tube removal 	

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the forehead or other facial areas that the patient can notice easily may be a source of irritation and a target for busy hands—the first thing for which a disoriented patient may reach. The adage “out of sight, out of mind” may be one of the most useful phrases to keep in mind in securing a nasally placed tube—not only to reduce the potential for dislodgment, but also for patient comfort and dignity. Securement to the side of the face on clean skin with transparent dressing is one way to help keep the tube from the patient’s line of vision. Large-bore enteral tubes used for suction (“NG tubes”) are often secured to the top of the nose by tape partially split and wrapped around the tubing, though these may also be secured to the side of the face instead of the nose if done in a secure fashion. Further securement to the neck area can provide additional security to the cheek dressing and is more desirable than pinning the

tube to the patient’s gown.

Care must be taken to prevent pressure necrosis of nasal tissue due to taping too tightly. The use of the smallest tube possible for suction or feeding, especially a softer one such as a silicone-based material, may be more comfortable as well as less apt to contribute to tissue damage, especially when secured to the side of the face (as opposed to dangling from the nose).

Level 2: Manufactured fixation devices

Level 2 involves manufactured products designed to secure the tube to the nose. Clinicians may find these devices helpful, and they may offer some advantages over traditional tape. Some commercially available devices have an engineered system with a dual-tab mechanism that can help prevent inadvertent dislocation of the tubes. Manufactured devices may

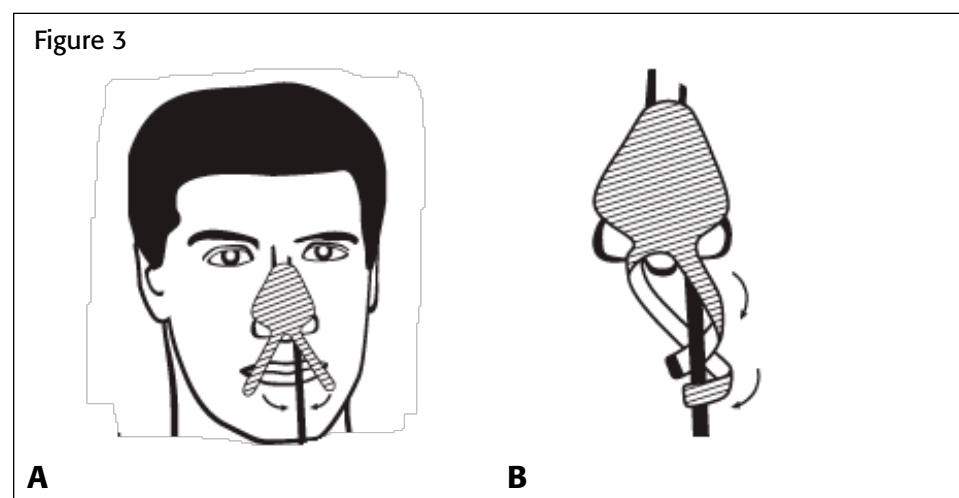
have an advantage over tape as they are held in place with a more “skin-friendly” adhesive that may prevent skin breakdown. Similar to the split tape used to secure the enteral tube to the nose, the tabs of such a device are wrapped around the tube in a spiraling fashion (see Figure 3) after the nasal piece is applied. The tube attached in this manner can also be secured to the cheek after it is fastened to the nose, to help prevent it from hanging in front of the patient’s face and then secured to the neck. As with any securement to the nares, the skin surrounding the securement system should be examined for signs of tension and alterations made as indicated.

Level 3: Nasal tube retention device or bridle

The nasal tube retention device or method, also known as a “bridle” or “bridle loop,” provides additional securement for patients who are at high risk for dislodging the nasally placed feeding or suction tube. High-risk patients include those who exhibit confusion, restlessness, agitation, or other risks for inadvertent displacement.

Various techniques and materials for bridling tubes have been described. The reader is referred to other sources for a more complete tutorial on bridle insertion techniques.^{8,9,10}

In general, the bridle enters one nares, wraps around the nasal septum, and exits through the other nares. Then both ends of the bridle are secured to the feeding tube by a mechanical clamp, skin securement strips or tape. The material for the bridle itself varies from a pliable pediatric feeding tube or IV tubing to 1/8-inch “umbilical tape.” Bridling is a quick bedside procedure (usually 5–20 minutes) that does not generally require additional sedation. Bridling is performed by a specially trained clinician, often a nurse. Staff



that bridle tubes should have special training, demonstrate competency through repeated successful procedures, and maintain skill through frequency of use.⁹

Bridling is associated with low morbidity and few complications. Nasal ulceration may occur if securement is too tight. The bridle material should not cause internal tissue pressure and patient discomfort, yet it must be secure enough to prevent tube dislodgement. To prevent the bridle loop from causing undue pressure on the septum, the feeding tube should be secured to the patient’s face in addition to the bridle. Other complications that may occur include sinusitis, bleeding, patient discomfort, and septal erosion or trauma.

In the severely agitated patient, the benefits of bridling a tube must be weighed against the potential for septal trauma, which has been reported rarely when the patient completely or partially pulls the bridle out of place.⁹ Like any medical decision, the clinician, patient and family must consider safety, benefits, and potential risks prior to bridling a nasally placed tube.

Removal of the bridled tube is done by cutting one—and only one—aspect of the bridle. The bridle (and the nasally placed enteral tube) then

can be pulled through the nares. To remove the bridle while keeping the feeding tube in place requires removing the bridle clamp or skin securement strips holding the bridle to the feeding tube, then gently withdrawing the bridle material through one nares, while ensuring that displacement of the tube does not occur. Information regarding bridle removal should be sent with a patient who transfers to another care facility with a bridled feeding tube.

Level 4: Chemical sedation/physical restraint use

Patients who are at high risk for causing serious harm to themselves, such as removing endotracheal tubes and feeding tubes, must be guarded against doing so, as they are often dependent on these lifelines. Sometimes minimizing this risk involves the use of restraints, including wrist restraints or mittens. However, it has been suggested that the use of physical restraints may actually increase a state of delirium and/or agitation, in turn, contributing to tube removal.⁷ Sedation and restraints are necessary on occasion, but they are to be used only when needed; and their necessity should be frequently reassessed. Alternatives for securing tubes, such as

those discussed above, should be used whenever possible. In addition, discussing the situation with the patient in a calm, person-to-person manner is important, as most people are more cooperative when well-informed.

Level 5: Personnel employed to observe and prevent self-harm

Employment of persons to prevent patients from harming themselves is an increasing reality in the healthcare arena, where the goal is to ensure safety while avoiding the use of restraints. While this may be very effective, it is an added expense to the already taxed cost of health care. Safe, effective alternatives should continue to be explored and utilized whenever possible, especially as patient cognition improves.

Practice strategies to prevent tube dislodgement: mark

Although the prevalence of feeding tube dislodgement and subsequent complications is well known, clinicians have not universally been taught valid strategies to decrease this problem. A review of five leading nursing textbooks utilized to train student nurses and establish standards of care revealed extensive discussion about enteral feeding and complications, including tube dislodgement. Ironically, only one of the texts addressed taping methods for securement and skin care,¹¹ which raises the question of whether lack of education regarding best securement practices is a significant part of the tube dislodgement cycle.

Although securement of the feeding tube seems to be a simple procedure, the difficulty of successfully accomplishing this is seen in the reported inadvertent tube removal occurrence of 40% or higher.^{4,5,12} We have developed the acronym MARK to guide the steps in this simple but often

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challenging process of securement.

M: Mark the exit site of tube

When the tube is first placed, mark the tube exit site from the nare or mouth with an indelible marker. If the tube is dislodged inadvertently, the clinician will be able to determine how far the tube has been removed and decide whether further assessment of tip termination is indicated. Additionally, the tube should be measured from exit to end and this amount recorded in the patient's medical record for ongoing reference. Some tubes have incremental markings that facilitate noting this in the medical record or other communications. Assessing the amount of external is a simple, quick way to glean information regarding tube placement.

A: Anchor tube

Shave the patient's facial hair and cleanse the skin to remove perspiration and oils that would decrease the securement method's adherence and life. Apply a skin barrier with adhe-

sive-enhancing qualities to the area where the tube will be secured, close to the nare on the side of the feeding tube insertion. Cover the prepared skin area with transparent dressing placed lengthwise on the cheek, overlapping dressings as necessary for additional security. Secure the tube to the neck—not to patient clothing, which may move. Pinch the tape to the feeding tube. This helps keep the tube out of the patient's line of vision. "Out of sight, out of mind" may, by itself, decrease the likelihood of tube dislodgement.⁸ Various methods of securing or anchoring enteral tubes have been addressed previously in this article.

R: Reassess often

Assess appropriate tube placement. Radiographic assessment continues to be the gold standard for initial tube confirmation, but ongoing monitoring for correct tube placement is essential. Confirmation of proper tube placement is critical 1) before each instillation of fluid or medication and 2) periodically, such as at least once a shift for continuous feedings. Many clinicians have been taught to listen for air bolus instillation over the stomach area to confirm tube placement. Tube misplacement in the esophagus may also be heard as a "whoosh" over the stomach area as a result of an echo effect. Thus, auscultation alone is no longer considered an accurate method to verify tube placement.¹³ Useful parameters include 1) assessment of the amount of external, as already discussed, 2) visual assessment of aspirate, and 3) pH measurement of aspirate, which may be useful, depending on the tube tip's location and other issues, such as medications administered to alter the acidity of the stomach.¹⁴ A repeat abdominal X-ray may be indicated in some cases. Because tube dislodgement

ment commonly occurs after transfers, it is necessary to exercise care with patient movement and procedures, and re-assess the tube position after each of these events.

K: Keep pressure off of skin or septum; knowledge

Prevention of pressure necrosis or erosion at the nares is an essential component of the securement strategy. The nurse must be vigilant in assessing skin condition at the feeding tube's exit site, to ensure there is no indication of pressure that can lead to skin breakdown. For tubes secured at the nose, also ensure that the tube is secured to the patient's face, to prevent undue pressure on the nasal septum.

K also represents knowledge. One cannot overemphasize the value of imbedding—creating a culture of safety by repeatedly enforcing safe practice in policy and procedures—as it relates to enteral tubes. It is critically important to 1) increase awareness of the potential risks of dislodgement, 2) prevent tube displacement, and 3) detect it, should it occur. Working closely with nursing and other clinical staff to provide tips and suggestions for preventing tube dislodgment can help reduce staff and patient frustration, and can also help optimize patient benefits related to the ongoing delivery of nutrition, fluid and medication via these tubes.

If all else fails

Inability to maintain the nasoenteral route for feedings due to dislodgement may precipitate a decision point in therapy. Will this patient continue on enteral feeds; i.e., is oral nutrition now possible, or have the goals of therapy changed? If ongoing enteral tube feeding is still indicated, is the placement of a percutaneous

gastrostomy or other abdominal tube necessary to maintain enteral access? An abdominal tube may be preferred in patients who are expected to need tube feedings longer than 4–6 weeks, and it may be more reliable in feeding tube delivery and reduction of tube dysfunctions.

Patients who have repeatedly dislodged nasally placed tubes may be at risk for dislodging a percutaneously placed tube as well. Clinicians need to take measures to prevent this, as the consequences of a displaced percutaneous tube can be very serious, especially in the first few weeks post-placement. Securement tips for abdominally placed tubes include the use of abdominal binders, tucking shirts into pants and other means to keep the tube “out of sight, out of mind” and away from busy fingers.

Summary

Enteral tube displacement can have dire consequences for patients when an instillation delivered to a partially removed tube is aspirated. Additionally, tube removal interrupts the delivery of nutrition or medication, causing potential patient discomfort and adverse effects. Additional health-care resources are also involved when tubes must be replaced, including clinician time and material costs. This article has suggested ways to keep enteral tubes secured to help reduce the potential for displacement. Means for detecting displacement have been explored as well. The clinician should utilize all available measures to secure enteral tubes, ensuring patient safety and efficacy while maintaining the patient's dignity and comfort as much as possible.

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meta-analyses, systematic literature reviews, or at least three well-designed, randomized, controlled trials. The INS also created an additional, unique Level I evidence category called “I A/P,” which is based on evidence from anatomy, physiology, and pathophysiology. While it is not used often throughout the standards, an example of I A/P evidence is stated in the Tourniquet Standard: “An arterial pulse should be easily palpable distal to the tourniquet location.”¹

Level II evidence includes at least two well-designed, randomized, controlled trials or a systematic literature review of varied prospective study designs.

Level III evidence includes at least one well-designed randomized controlled trial (RCT) or several quasi-experimental designs focused on the same question.

Level IV evidence is based on case control or cohort studies, narrative literature reviews, or systematic literature reviews based on descriptive and qualitative studies. Qualitative studies include research that involves data collection in non-numeric form, such as interviews, with the intention of describing a phenomenon.²

Level V evidence includes descriptive studies and information from clinical articles, textbooks, or well-designed quality improvement projects.

An additional category, called “regulatory,” is not based on evidence, but rather on regulations set forth by organizations with oversight for monitoring the standards’ adoption and practice; for example, State Boards of Nursing.¹

These levels of evidence provide the framework upon which all 68 INS standards have been written. This arti-

Stabilization is best achieved with the use of a “catheter stabilization device,” defined as “a device/system specifically designed and engineered to control movement at the catheter hub.

cle examines three of those standards, discusses their respective levels of evidence, and explains how the levels of evidence may impact nursing decisions related to VADs. To read more about evidence-based practice, the following references listed at the end of this article are recommended: Hagle and Senk (2010)³ and Melnyk and Fin-eout-Overholt (2005).²

INS Standard 36: Vascular access device stabilization

Standard 36 of the INS Standards is titled “Vascular Access Device Stabilization.” Catheter stabilization is as an important intervention for 1) increasing the dwell time for central vascular access devices (CVADs) and peripheral IV (PIV) catheters and 2) reducing the risk of phlebitis, infection, catheter migration, and catheter dislodgment. Inadequately secured VADs pose risks that may adversely affect the quality of patient care. Conversely, properly stabilized devices can preserve VAD site integrity and improve patient satisfaction.

The concept of “stabilization” is often misunderstood. Many nurses equate stabilization with application of a dressing and tape for peripheral IV catheters or possibly the use of sutures for a central vascular access device (CVAD). But Standard 36 says stabilization is best achieved with the use of a “catheter stabilization device,” defined as “a device/system specifically designed and engineered to control movement at the catheter hub, thereby decreasing catheter movement within the vessel and risk of catheter malposition.”¹ The Practice Criteria within Standard 36 recommend the following:

- Using a catheter stabilization device as the preferred alternative to tape or sutures
- Avoiding the use of sutures (which mitigates the risk of accidental needlestick injury)
- Considering the evidence and benefits versus risks when using a stabilization method

Stabilization devices with peripheral IVs

Commonly used catheter stabilization devices consist of an adhesive pad and a mechanism to hold the catheter to the pad, thereby controlling movement at the insertion site. Benefits of such devices have been cited in several studies. One researcher pooled prospective data from product trials at 83 organizations on more than 10,000 patients, comparing tape versus a specific catheter stabilization device for PIVs. The results showed that a specific stabilization device significantly reduced total complications including phlebitis by 67% and reduced unscheduled peripheral IV restarts by 76%. These results translate to significant annual savings in material and labor costs. Although

observational studies such as this one have some inherent limitations, this is by far the largest study of its kind that has evaluated the efficacy of a VAD stabilization device.⁴

More recently, the only randomized controlled trial of its kind compared the use of two different kinds of stabilization devices: a platform peripheral IV catheter (essentially a “winged” catheter) in combination with an IV securement transparent dressing and a specific catheter stabilization device. The large medical center involved was a Magnet-designated Level I trauma center with a nursing VAD team that specializes in difficulties with VAD placement. In the 302 patients studied, both stabilization devices performed equally well. One cost 25% less than the other.⁵ Because peripheral IV catheters are used widely, interventions that can reduce potential complications and the frequency of IV site rotation are highly advantageous. This area is worthy of further study.

Stabilization devices with central vascular access devices

Where CVADs are concerned, traditional practice has included the use of sutures to stabilize the catheter; however, sutures may increase the risk for infection. Biofilms grow on sutures, increasing the risk of infection at and around the catheter insertion site.⁶ In an often cited prospective randomized study, 170 patients with peripherally inserted central catheters (PICCs) were randomized either to sutures or to the placement of a manufactured stabilization device.⁷ Although the unplanned removal rates and total complication rates between the two groups did not reach statistical significance, the incidence of systemic infections was statistically higher in the sutures group (3.4 versus 0.7 per 1,000 catheter days; $P = 0.028$). Securement time (the time required

to apply the stabilization device or sutures) was significantly shorter in the device group. One needlestick injury was reported in the suture group. The INS level of evidence for use of catheter stabilization devices is rated as Level III, due to the lack of more randomized controlled studies. However, lower-level evidence exists, including descriptive studies regarding the advantages and utility of preferentially using catheter stabilization devices.

How understanding the levels of evidence can help with care decisions

As stated earlier, one of the practice criteria recommends weighing the evidence and benefits against the risks—and this is where understanding the criteria as well as their supporting evidence becomes critical. While the evidence promotes use of a securement device and suturing CVADs is not recommended, the use of sutures may be considered appropriate in special CVAD populations, such as pediatric patients or patients with skin integrity problems that preclude the use of tape or an engineered stabilization device.¹ Thus, all nurses who place and/or monitor PIVs and CVADs need understand the concept, importance, and rationale of catheter stabilization. When they do, they can rightly make such judgment calls—in particular, with CVADs.

Related Issues

Removal and replacement of the catheter stabilization device are related issues. These activities are done at regular intervals according to 1) the the manufacturer’s recommendations and/or 2) in conjunction with VAD replacement or with regular site care and dressing changes.¹ A stabilization device used with a PIV catheter is applied when the catheter is placed and is removed when the catheter is re-

moved. For CVADs, most recommendations are to change the stabilization device *at least* every seven days. If sutures initially used to stabilize the CVAD loosen or are no longer intact, they should be removed and the device should be secured using another stabilization method, or re-sutured, as is appropriate.¹

The last practice criterion in CVAD stabilization is catheter migration. If a catheter has migrated externally, it never should be re-advanced into the vein prior to applying the catheter stabilization device; rather, the catheter should be stabilized at the point of migration. Prior to use, the catheter should be assessed further for proper placement in the vasculature. If the catheter is migrating out, there is risk that the catheter tip is no longer in proper position in the central vasculature, which is recommended to be in the superior vena cava near its junction with the right atrium.¹

INS Standard 37: Joint stabilization

Joint stabilization is defined as a device used to stabilize or restrict movement of the joint.¹ While Standard 33, Site Selection, includes the recommendation to avoid areas of flexion when placing a peripheral IV catheter, there are instances when placement at or near a joint is necessary or unavoidable. Because joint movement increases the risk of catheter dislodgement and complications such as infiltration or phlebitis, minimizing such movement is recommended. According to the Hadaway reference⁸ cited in Standard 37, peripheral sites in the dorsal aspect of the hand and the cephalic vein of the medial wrist are the most problematic sites and demand the use of joint stabilization. In another cited reference related to pediatric patients, Frey and Pettit⁹ state that specially designed devices should be used with pediatric patients

to minimize common complications such as dislodgement and infiltration. Specific recommendations include allowing the fingers to extend beyond the edge of the device to allow for finger range of motion.

The strength of the evidence supporting the majority of Standard 37's criteria is rated at Level V because it is based primarily on clinical articles, textbooks, and consensus-based guidelines. However, one cited source of evidence was a randomized, controlled trial—the first of its kind to investigate multiple factors affecting the patency of peripheral IV catheters in children. Among the variables was the application of a “splint.”¹⁰ The investigators noted that splinting is a common practice with hospitalized pediatric patients, but a paucity of RCTs exists to support its efficacy. Results from 377 catheters in 88 patients showed that use of a splint significantly extended catheter patency (50.29 hours with splint versus 39.75 hours without; $P < 0.05$).

Joint Stabilization Devices are not Restraints

Note that a joint stabilization device, which may be an armboard or splint of some sort, is not considered a restraint. The joint stabilization device should be padded and should support the area of flexion, thus protecting the joint from movement. Armboards are commercially available in different contours and sizes to accommodate individual patient needs. Tape used for securing the armboard or splint should be applied carefully so that 1) the catheter insertion site and vein can be assessed visually and 2) the circulation or nerves are not constricted.

It is important to assess skin integrity the entire time an armboard or splint is used, as skin breakdown and pressure ulcers are risks. In fact, Standard 38, Site Protection, recommends

Joint stabilization is defined
as a device used to stabilize
or restrict movement
of the joint.

that any device used to protect the IV site be removed at established intervals to allow circulatory assessment and supervised range of motion.¹ To facilitate site inspection and risks of pressure ulcers, there are commercially available armboards that are covered in soft materials and fastened to the arm with adjustable Velcro® straps (Figure 1).

Patient involvement and symptom reporting

Patient education is always important. Standard 11, Patient Education,¹ addresses the need to instruct the patient in signs and symptoms of complications to report. Patients should be instructed to report any complaints of pain or discomfort in the area of the catheter or in the area of the joint stabilization device. However, because some patients (such as neonates or unconscious patients) may not be able to report symptoms, ongoing nursing assessments of skin integrity and circulation are critical.



Figure 1. Joint stabilization device (Courtesy Dale Medical Products Inc.)

INS Standard 38: Site protection

“Site protection” is defined as a method or product used to protect the catheter insertion site.¹ Site protection includes the use of any physical immobilization device as already mentioned; it may also include mittens or clear plastic site protectors, typically used with pediatric patients. The type of site protection selected is based on a comprehensive assessment that includes the patient's physical, behavioral, and psychological status. Site protection may be necessary with patients who exhibit confusion or other cognitive deficits. Hiding or camouflaging the site to reduce inadvertent manipulation at the catheter site is considered an alternative to physical restraints, as the latter should be avoided.¹¹ In fact, INS Standard 38 (not a practice criterion) states, “The use of physical immobilization devices to protect the vascular access device shall not be routinely implemented and shall be avoided whenever possible.”¹

Whatever method is used, it is important that the method does not interfere with the ability to assess the catheter site, infusion rate, infusion delivery method, and the catheter stabilization method used. As noted earlier, immobilization devices should be removed to assess circulation and range of motion; they also should be removed when no longer needed. This stipulation is considered a regulation, based on citations from the Centers for Medicare and Medicaid Services pertaining to patient rights. Patient and caregiver education should address the need for and appropriate use of any site protection or immobilization device. Evidence supporting the site protection standard is mostly Level V.

Standards and nursing competencies

Finally, it is important to under-

score that these three standards include the following 2011 standards statements:

- Catheter and joint stabilization and site protection shall be addressed in the organization's policies, procedures, and/or practice guidelines.
- The nurse shall be competent in proper use and application [of VAD stabilization, joint stabilization, and site protection methods/devices].

Sometimes the need for policies, procedures and practice guidelines is under-rated or under-recognized. However, such policies are critical to nursing 1) communications, 2) wide-spread adoption, 3) daily practice, and 4) periodic competency evaluations. Across all healthcare settings, nurses must have appropriate policies and procedures readily available to them as resources.

Most infusion-related complications are preventable with proper care and monitoring. Both right care and right monitoring happen when the nurse is knowledgeable and competent in performing the procedure, as well as in understanding the rationale for and proper use of devices. As stated in Standard 6, Competence and Competency Validation, the nurse is responsible and accountable for attaining and maintaining competence with infusion therapy.

Employers should use competency validation processes to document the nurse's knowledge, skills, behaviors, and abilities.¹ For example, proper application and use of a catheter stabilization device should be validated with a competency assessment. The competency should address proper use of the product, maintenance of aseptic technique during the procedure, and catheter stabilization during the placement procedure, as inadvertent catheter dislodgement is a risk

for the patient—and the nurse who is not competent in the procedure.

Conclusions

In summary, the risks of inadvertent catheter dislodgement and catheter complications are reduced significantly when attention is paid to catheter stabilization, joint stabilization, and site protection. All nurses across all healthcare settings should strive to understand and apply these standards in their day-to-day practice.

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After reading this article, the learner should be able to:

1. Discuss displacement of nasally placed enteral tubes in terms of implications for the patient as well as the health care system
2. Describe methods to prevent nasally placed enteral tube displacement
3. List the benefits of catheter stabilization
4. Differentiate between the INS Standards of catheter stabilization, joint stabilization, and site protection.

To receive continuing education credit, simply do the following:

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 9. Faculty disclosures: No conflicts were disclosed.
- * Approval does not imply ANCC or VSNA endorsement of any product.

1. A practice criterion that includes three randomized controlled trials as references would be rated at what level of evidence according to the INS rating scale:
 - a. Level I
 - b. Level II
 - c. Level III
 - d. Level V
2. Catheter stabilization
 - a. Is primarily implemented to prevent catheter dislodgement
 - b. Is associated with reduced risk of phlebitis
 - c. Is associated with reduced risk of infiltration
 - d. Increases the dwell time of peripheral, but not central, vascular access devices
3. Peripheral IV catheter stabilization is achieved by
 - a. Application of a transparent dressing
 - b. Placement of sutures
 - c. Use of a catheter stabilization device
 - d. Use of special tape to hold the catheter in place
4. External catheter migration:
 - a. Requires re-advancement of the catheter back into vein
 - b. Requires prompt catheter removal
 - c. Requires re-evaluation of proper tip position in the vasculature
 - d. Requires catheter replacement
5. A problematic peripheral IV catheter site that requires joint stabilization includes:
 - a. Dorsal aspect of the hand
 - b. Cephalic vein of the mid-forearm
 - c. Basilic vein upper forearm
 - d. Basilic vein of the hand
6. Risks of joint stabilization devices include
 - a. Pressure ulcers
 - b. Infections
 - c. Infiltrations
 - d. Phlebitis
7. Site protection methods include:
 - a. Hiding the IV site from a patient who is confused
 - b. Use of a catheter stabilization device
 - c. Sutures
 - d. Use of a transparent dressing
8. Patient education should include:
 - a. How to change the catheter stabilization device
 - b. How to remove the joint stabilization device
 - c. Reporting any pain in the area of the catheter
 - d. To regularly perform range of motion exercises
9. Adverse effects of enteral tube displacement include:
 - a. Aspiration of infused content
 - b. Altered tolerance to feeding when infused into unintended location
 - c. Effects related to interruption of feeding, fluid and/or medication
 - d. All of the above
10. Adverse effects of the process of inserting enteral tubes include:
 - a. Epistaxis
 - b. Esophageal perforation
 - c. Aspiration of infused content when tube misplaced
 - d. All of the above
11. A most appropriate method to secure enteral feeding tubes according to this article is:
 - a. Tape the tube to the forehead
 - b. Pin the tube to the patient gown
 - c. Secure the tube around the ear
 - d. Secure the tube to clean skin on the side of the face
12. To best monitor placement of an enteral tube:
 - a. Monitor marking and/or measurement of the tube at the exit site
 - b. Listen for an air bolus infused via the tube over the left upper quadrant
 - c. Obtain daily abdominal radiographs
 - d. Resecure the tube every shift

Participant's Evaluation

What is the highest degree you have earned (circle one)?

1. Diploma 2. Associate 3. Bachelor's
4. Master's 5. Doctorate

Indicate to what degree you met the objectives for this program: Using 1 = strongly disagree to 6 = strongly agree rating scale. Please circle the number that best reflects the extent of your agreement to each statement.

	Strongly Disagree			Strongly Agree		
	1	2	3	4	5	6
1. Discuss displacement of nasally placed enteral tubes in terms of implications for the patient as well as the health care system						
2. Describe methods to prevent nasally placed enteral tube displacement						
3. List the benefits of catheter stabilization						
4. Differentiate between the INS Standards of catheter stabilization, joint stabilization, and site protection.						

Name & Credentials _____
 Position/Title _____
 Address _____
 City _____ State _____ Zip _____
 Phone _____ Fax _____
 Email Address _____

Mark your answers with an X in the box next to the correct answer

1	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	9	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D
2	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	10	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D
3	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	11	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D
4	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	12	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D
5	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	13	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D
6	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	14	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D
7	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	15	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D
8	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	16	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D

How long did it take you to complete this home-study program? _____

What other areas would you like to cover through home study?
