



Dislodged Gastrostomy Tubes: Preventing a Potentially Fatal Complication

Michelle Feil, MSN, RN, CPPS
Senior Patient Safety Analyst
Pennsylvania Patient Safety Authority

ABSTRACT

A Pennsylvania healthcare facility contacted the Pennsylvania Patient Safety Authority after experiencing two events involving dislodged gastrostomy tubes that resulted in serious patient harm. Querying the Pennsylvania Patient Safety Reporting System, analysts found that healthcare facilities submitted 1,858 event reports involving gastrostomy tubes between January 2011 and December 2015. Dislodgement was the most frequently reported problem, described in 996 event reports. Of these, 73 were reported as Serious Events resulting in patient harm, with the highest level of harm (including peritonitis, sepsis, and death) reported in cases in which these tubes continued to be used for enteral feeding before providers realized that the tubes were in an improper position. Potential causes for dislodgement were described in about two-thirds of reports, with the top two causes identified as (1) patient pulling on the tube, and (2) movement of the tube during patient transfer, repositioning, or other care. Hospitals can decrease the risk for this complication by implementing best practices and risk reduction strategies to confirm proper positioning of gastrostomy tubes and to prevent, recognize, and manage dislodgement. (*Pa Patient Saf Advis* 2017 Mar; 14[1]:9-16.)

INTRODUCTION

A Pennsylvania healthcare facility experienced two recent events involving dislodged gastrostomy tubes that resulted in serious patient harm due to peritonitis. In both events, delays occurred in recognizing that the tubes were dislodged. These delays allowed time for gastric contents to leak into the surrounding tissue, requiring intravenous antibiotics and surgery to “wash out” the peritoneal cavity and remove damaged tissue. Despite providing staff education and implementing a protocol to confirm and document proper tube placement, the facility was concerned about recurrence. The facility contacted the Pennsylvania Patient Safety Authority to discuss this concern, to ask whether other facilities were experiencing the same problem, and to learn of additional strategies to prevent this complication.

In response to this inquiry, Authority analysts queried the Pennsylvania Patient Safety Reporting System (PA-PSRS) database to identify similar events and other reported events associated with gastrostomy tubes. Further, analysts reviewed the medical literature to determine the frequency of gastrostomy tube dislodgement and to identify strategies to prevent, recognize, and manage this complication.

Background

A gastrostomy tube is a tube placed through the abdominal wall directly into the stomach for decompression or provision of long-term enteral nutrition. A gastrojejunostomy tube has one lumen that terminates in the stomach and one lumen that terminates in the jejunum. This tube is used when both gastric decompression (via the gastric port) and enteral nutrition (via the jejunal port) are needed. These tubes can be placed using surgical, endoscopic, or radiologic techniques.¹ For this article, the term gastrostomy tube is used to refer to both gastrostomy and gastrojejunostomy tubes.

Percutaneous endoscopic gastrostomy (PEG) has become the more commonly used technique for gastrostomy tube placement because it requires less time to perform than surgical placement, is less invasive, and does not require general anesthesia—a particular advantage for older and high-risk patients.^{2,3} As for complications, both surgically and endoscopically placed tubes have been found to have the same, frequent, minor complications (i.e., leaking, dislodgement, and superficial cellulitis), and major complications (i.e., aspiration, peritonitis requiring surgical intervention, sepsis, and death).³

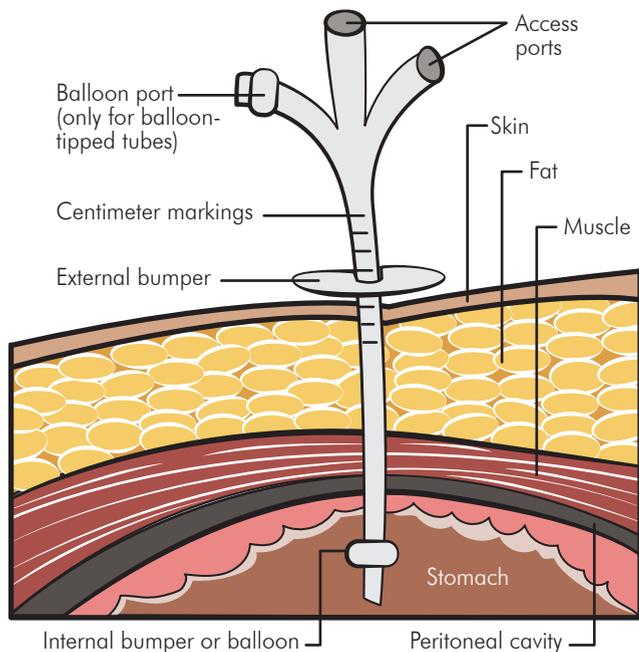
Gastrostomy tubes are held in place by an inner bumper or balloon that rests against the inside wall of the stomach and an external bumper or other securement device that rests against the patient’s abdomen. With newly placed gastrostomy tubes, the inner bumper helps to hold the stomach against the inner anterior wall of the abdomen (see Figure 1), so that the stomach can adhere to the wall as the gastrocutaneous tract and stoma matures—usually within the first 14 days. It is during this time period that dislodgement can result in major harm to the patient, up to and including death, whereas dislodgement after this time period is more likely to result in minor harm or no harm.⁴ Researchers have estimated dislodgement to occur in up to 5.3% of patients within the first 14 days after placement,^{5,12} and in 12.8% of patients over the lifetime of the tube.¹²

METHODS

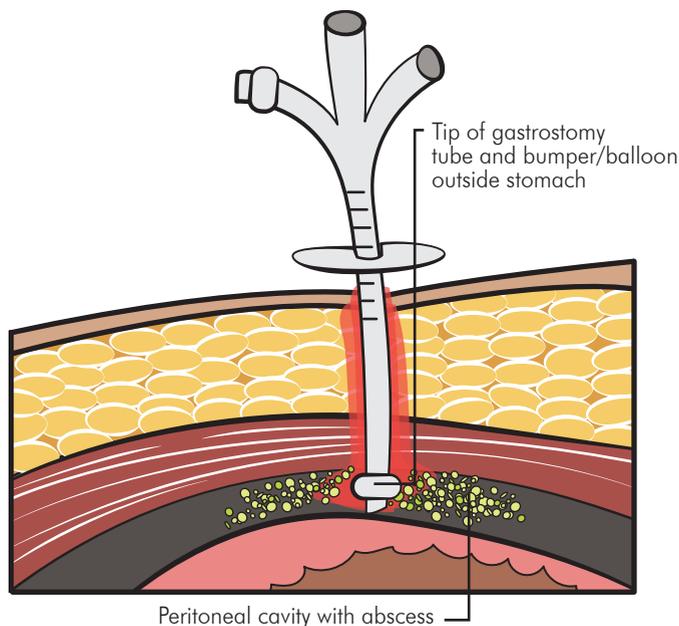
Analysts identified events involving gastrostomy tubes by querying the PA-PSRS database for reports containing the terms “gastrostomy,” “gastrojejunostomy,” “PEG,” “GT,” “GJT,” and “g tube,” (including misspellings) that were submitted over five years, from January 2011 through December 2015.

Figure 1. Properly Placed and Dislodged Gastrostomy Tubes

PROPER GASTROSTOMY TUBE PLACEMENT



DISLODGED GASTROSTOMY TUBE



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Analysts manually reviewed all reports and eliminated those that described events not directly involving these tubes (e.g., skin integrity event reports that mention gastrostomy tube feeding as an intervention to promote wound healing, aspiration event reports that mention plans for gastrostomy tube placement).

Events identified as directly involving gastrostomy tubes were analyzed according to PA-PSRS event type and harm score and categorized according to the specific problems described in the event narratives (e.g., clogged or leaking tubes, pain, medication administration problems). Analysts further examined event reports describing dislodged gastrostomy tubes to identify potential causes of dislodgement.

RESULTS

The query identified 1,858 event reports; 548 were excluded for lack of relevance, leaving 1,310 reports that directly involved gastrostomy tubes. Gastrostomy tube events were reported for patients across all age groups, with the majority reported for patients older than the age of 50 (n = 862, 65.8%; see Figure 2).

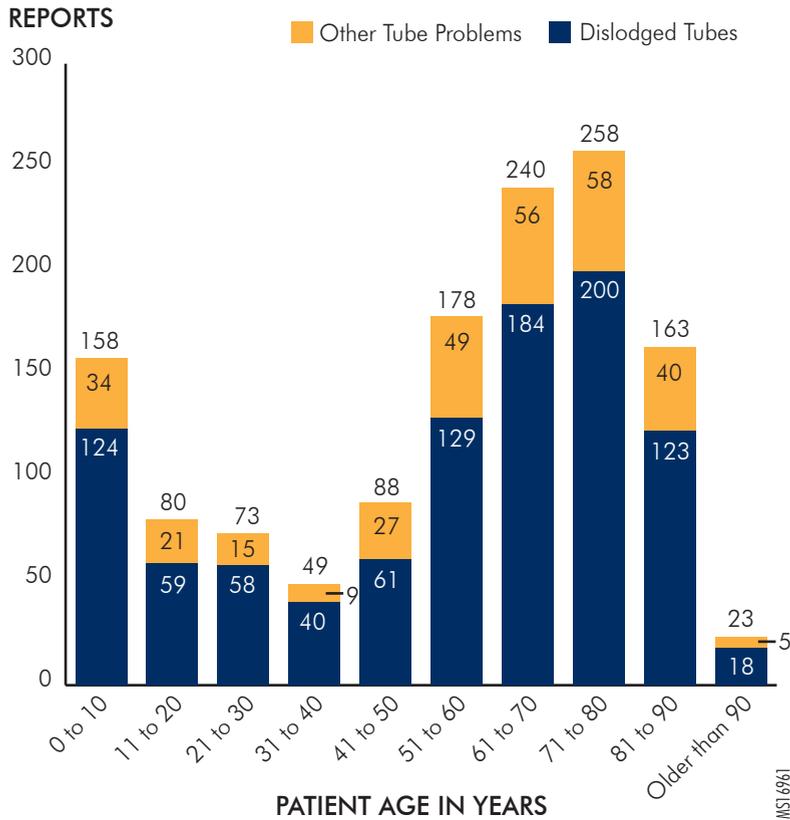
Event Type and Harm Score

Complication of procedure, treatment, or test was the most frequently reported event type (n = 835 of 1,310; 63.7%), followed by other or miscellaneous (n = 177; 13.5%).

The majority of events were reported as Incidents without harm to patients (n = 1,187; 90.6%).

Table 1 shows the number of events reported as either Incidents or Serious Events, for each event type. Of 123 events reported as Serious Events resulting in patient harm, most were reported as resulting in temporary harm. (n = 107; 87.0%), followed by death (n = 12; 9.8%), near-death requiring life-sustaining treatment (n = 3; 2.4%), and permanent harm (n = 1; 0.8%).

Figure 2. Gastrostomy Tube Events (n = 1,310) including Dislodged Gastrostomy Tube Events (n = 996), by Patient Age



Gastrostomy Tube Problems

Dislodged and possibly dislodged tubes were the most frequently reported problem (n = 1,026 of 1,310; 78.3%), which held true across all age groups (see Figure 2). The second most frequently reported problem was mechanical (n = 122; 9.3%). Table 2 lists all problems identified in reports to the Authority for events involving gastrostomy tubes.

Potential Causes of Dislodged Gastrostomy Tubes

The most frequently identified potential cause for dislodged and possibly dislodged gastrostomy tubes was the patient pulling on the tube (n = 326 of 1,026; 31.8%), followed by movement of the tube during patient transfer, repositioning, or other care (n = 204; 19.9%), and deflated or ruptured retention balloons (n = 72; 7.0%). Other potential causes are listed in Table 3. More than one-third of reports for dislodged or possibly dislodged gastrostomy tubes did not identify a potential cause (n = 364; 35.5%).

Serious Events Associated with Dislodged Gastrostomy Tubes

Of 996 reports for events involving dislodged gastrostomy tubes, 73 (7.3%) were

Table 1. Gastrostomy Tube Events by Event Type and Harm Score* (N = 1,310)

EVENT TYPE	INCIDENTS (% OF TOTAL INCIDENTS)	SERIOUS EVENTS (% OF TOTAL SERIOUS EVENTS)	ALL EVENTS (% OF TOTAL FOR ALL EVENTS)
Complication of procedure, treatment, or test	744 (62.7)	91 (74.0)	835 (63.7)
Other or miscellaneous	163 (13.7)	14 (11.4)	177 (13.5)
Error related to procedure, treatment, or test	79 (6.7)	8 (6.5)	87 (6.6)
Skin integrity	65 (5.5)	3 (2.4)	68 (5.2)
Equipment, supplies, or device	66 (5.6)	1 (0.8)	67 (5.1)
Fall	44 (3.7)	2 (1.6)	46 (3.5)
Medication error	26 (2.2)	4 (3.3)	30 (2.3)
TOTAL	1,187	123	1,310

Note: Data reported to the Pennsylvania Patient Safety Authority, 2011 through 2015.

* Event types and harm scores are defined by Pennsylvania Patient Safety Reporting System taxonomy and are assigned to events by healthcare facilities at the time of report submission.



Table 2. Gastrostomy Tube Problems* Identified in Event Reports (N = 1,310)

PROBLEM	NO. OF REPORTS †
Dislodged or possibly dislodged tube	
Dislodged tube	996
Possibly dislodged tube	30
Total	1,026
Mechanical problems‡	
Leaking tube	60
Clogged tube	47
Other mechanical problem	24
Total	122
Impaired skin integrity	84
Insertion and removal problems	
Insertion problem	65
Removal problem	14
Total	79
Other Tube Care Problems§	
Medication administration issues	19
Enteral nutrition administration issues	16
Not clamped or draining as ordered	16
Wrong port accessed (i.e., gastric, jejunal, or balloon ports)	15
Not flushed or irrigated correctly	4
Site care or dressing not appropriate	4
Total	55
Pain	38

Note: As submitted to the Pennsylvania Patient Safety Authority, 2011 through 2015.

* Gastrostomy tube problems were identified as a result of qualitative analysis of event report narratives.

† Some event report narratives described more than one gastrostomy tube problem; therefore, the number of reports totals more than 1,310.

‡ Some event report narratives described more than one mechanical problem; therefore, the number of reports totals more than 122.

§ Some event report narratives described more than one other tube care problem; therefore, the number of reports totals more than 55.

reported as Serious Events resulting in patient harm. Most of these were reported as resulting in temporary harm (n = 62 of 73; 84.9%), followed by death (n = 9; 12.3%), and near-death requiring life-sustaining treatment (n = 2; 2.7%).

Event narratives for events resulting in death described cardiac arrest due to complications from peritonitis including

sepsis, necrotizing fasciitis, and multiorgan failure. Five of the nine event narratives described enteral feeding formula leaking into the peritoneal cavity before dislodgement was recognized.

PA-PSRS Events Narratives

The following are examples of patient safety events in which delayed recognition

of dislodged gastrostomy tubes resulted in patient harm.*

A 66-year-old male was admitted with a PEG [percutaneous endoscopic gastrostomy] tube that had been inserted at another facility. The next day, the patient vomited twice and the PEG site began leaking bile and tube feeding. The tube feeding was held and the PEG was placed to straight drainage. On the fourth day surgery was consulted for a suspected acute abdomen. During surgery, a large amount of intraperitoneal fluid was found, consistent with gastric perforation. The PEG site was leaking gastric contents. The stomach showed no attachment to the abdominal wall.

A 74-year-old male had a Foley catheter being used as a gastrostomy tube. The nurse auscultated over the stomach to confirm correct placement before administering medication. Thirty minutes later, the JP [Jackson Pratt] drainage was noted to be increasing and had the appearance of tube feeding. The physician ordered a STAT chest x-ray and for the gastrostomy tube to be placed to gravity to drain. Upon assessment, the balloon was found to be deflated with the tube not fully in the stomach. The patient was scheduled to go to the operating room for an abdominal exploration.

An 18-month-old girl was seen in the emergency room for a gastrostomy tube that fell out 11 days after placement. The parents had placed a Foley catheter in its place, and a new gastrostomy tube was placed without issue. The parents called the surgeon the following day to report that the tube was leaking formula, but was not loose, and the child seemed

* The details of the PA-PSRS event narratives in this article have been modified to preserve confidentiality.

Table 3. Potential Causes for Gastrostomy Tube Dislodgement* Identified in Event Reports (N = 1,026)

POTENTIAL CAUSES FOR DISLODGE MENT	REPORTS (%) †
Patient pulling on the tube	326 (31.8)
Movement of the tube during patient transfer, repositioning, or other care	204 (19.9)
Balloon deflated or ruptured	72 (7)
Patient fall	46 (4.5)
Increased intra-abdominal pressure (i.e., coughing, sneezing, crying, vomiting)	16 (1.6)
Inadequate securement	6 (0.6)
Tubing broken or ruptured	2 (0.2)
No reason reported	364 (35.5)

Note: Data submitted to the Pennsylvania Patient Safety Authority, 2011 through 2015.

* Potential causes for gastrostomy tube dislodgement were identified as a result of qualitative analysis of event report narratives.

† Some event report narratives described more than one potential cause for gastrostomy tube dislodgement; therefore, the number of events totals more than 1,026, and the total percentage exceeds 100.

comfortable. The next morning the child was found dead at home. An autopsy identified the cause of death as acute peritonitis, following dislodged gastrostomy tube. The findings note that the tip of the feeding tube was not in the stomach.

DISCUSSION

Pennsylvania healthcare facilities have reported a variety of patient safety event types and problems involving gastrostomy tubes, with dislodgement identified as the most frequently reported problem across all age groups. The majority of gastrostomy tube events, including events involving dislodgement, have been reported as Incidents, without harm to patients. However, consistent with the literature,^{2-10,12,13} Serious Events resulting in patient harm, up to and including death, have been reported for events involving dislodged gastrostomy tubes. The highest levels of harm involved cases in which these tubes continued to be used for enteral feeding before providers realized that the tubes were in an improper position.

Aside from peritonitis, sepsis, and death, other serious harm can result from even minor changes in gastrostomy tube position, particularly in the first few weeks before the gastrocutaneous tract matures. In fact, even a change in tube position of just six millimeters may indicate dislodgement or other problems, such as “buried bumper syndrome” (i.e., when excessive tension causes the internal bumper to erode the gastric lining or abdominal wall or both) or pyloric obstruction (i.e., when the internal bumper or balloon migrates into the stomach, blocking the gastric outlet).^{4,13,14}

The American Society for Parenteral and Enteral Nutrition (ASPEN) has long recognized the potential for serious patient harm associated with enteral nutrition therapy. In response, ASPEN in 2009 convened an interdisciplinary task force to issue comprehensive enteral nutrition practice recommendations. The task force stated, “While the process of administering [enteral nutrition] may appear less complex compared with parenteral nutrition, serious harm and death can result due to potential adverse events occurring

throughout the process of ordering, administering, and monitoring.”¹⁴ ASPEN issued new recommendations in November 2016, concurrent with Authority analysis of gastrostomy tube events reported to PA-PSRS. The updated recommendations reflect a heightened emphasis on patient safety, including a detailed description of practices to prevent dislodgement.¹⁵ See “2016 ASPEN Safe Practices for Enteral Nutrition Therapy” for more information.

Facility Efforts to Reduce Dislodged Gastrostomy Tube Events

The Authority spoke with a representative of the healthcare facility that had expressed concern over recent adverse events involving dislodged gastrostomy tubes to learn what strategies had been implemented as part of its performance improvement plan to reduce the risk for similar events happening in the future. “We looked at the entire process, from the point of gastrostomy tube insertion, performed by our surgeons, through to the daily care and maintenance of gastrostomy tubes, performed by our bedside nurses,” said the facility representative.

The first change implemented was to require surgeons to document the centimeter marking at the skin level in the electronic health record for newly placed tubes. The brand of gastrostomy tube used at the facility is manufactured with centimeter markings on the tube.

The second change was to require nurses to assess and document the centimeter marking at the skin level with every clinician handoff immediately after placement: from the operating room to the post-anesthesia care unit, from the post-anesthesia care unit to the intensive care or medical-surgical unit, and at every shift change. For patients with existing gastrostomy tubes with mature gastrocutaneous tracts, this assessment and documentation is required daily.



2016 ASPEN SAFE PRACTICES FOR ENTERAL NUTRITION THERAPY

The American Society for Parenteral and Enteral Nutrition (ASPEN) published “ASPEN Safe Practices for Enteral Nutrition Therapy” in November 2016. These consensus recommendations update ASPEN’s “Enteral Nutrition Practice Recommendations,” last published in 2009. The new title further emphasizes ASPEN’s commitment to patient safety. ASPEN recognizes that enteral nutrition is a complex therapy with potential for adverse events that can result in serious patient harm, including death. Notable updates include stronger recommendations against the use of auscultation and aspiration of gastric contents to confirm proper tube placement (radiographic confirmation is the gold standard), and the addition of new recommendations dedicated to securing enteral tubes and preventing their dislodgement.

The MARK acronym, included in the recommendations, is suggested for use as a guide for maintaining proper tube placement.

Mark the tube at the exit site using an indelible marker and record the external length at the time of tube placement.

Anchor the tube using the proper securement device and technique, which varies by tube and anatomical location.

Reassess tube placement, especially in patients at risk for dislodgement or during activity that increases risk of dislodgement, such as patient transfer and repositioning.

Keep pressure off the skin (or nasal septum) at the insertion site, and ensure staff have the Knowledge needed to ensure safe practice in policy, procedure, and clinical practice.

Source: Boullata JJ, Carrera AL, Harvey L, Escuro AA, Hudson L, Mays A, McGinnis C, Wessel JJ, Bajpai S, Beebe ML, Kinn TJ, Klang MG, Lord L, Martin K, Pompeii-Wolfe C, Sullivan J, Wood A, Malone A, Guenter P, ASPEN Safe Practices for Enteral Nutrition Therapy Task Force, American Society for Parenteral and Enteral Nutrition. ASPEN safe practices for enteral nutrition therapy. *JPEN J Parenter Enteral Nutr.* 2017 Jan;41(1):15-103. Epub 2016 Nov 5. Also available: <http://dx.doi.org/10.1177/0148607116673053>. PMID: 27815525

In rolling out these changes, a problem was identified with the electronic health record, “We found that the place to document the centimeter marking at the skin level was ‘hidden.’ So we worked with our informatics team to change those fields to remain ‘face up’—in other words, always visible to nurses when completing their documentation,” said the representative.

Education was provided to all staff, “but we know that we must remain vigilant—especially when patients with gastrostomy tubes are cared for on units that don’t usually see a lot of these tubes,” said the representative.

The facility is also looking into purchasing a new external securement device. “We have had trouble finding a good anchor for gastrostomy tubes that do not have an external bumper,” said the representative. “We are currently using a device that is similar to a [urinary catheter] securement device—it is like tape, with a Velcro strap that goes around the tube. But we

are looking for something more effective that will stay in place and limit tube movement.”

Lastly, the facility representative told the Authority that the facility believes the lessons learned and strategies implemented to prevent dislodged gastrostomy tubes can be applied broadly to all tubes, including vascular access devices, endotracheal tubes, and surgical drains.

Best Practices and Risk Reduction Strategies

The following best practices and risk reduction strategies are suggested to confirm proper positioning of gastrostomy tubes and to prevent, recognize, and manage dislodgement.

- Review current recommendations from ASPEN for safe enteral nutrition therapy practices, including gastrostomy tube care and steps to prevent dislodgement.¹⁵
- Document the tube type, tip location, and external centimeter markings in the medical record at the time of gastrostomy tube insertion and with follow-up physical assessments.^{4,14,15}
- Assess the gastrostomy insertion site daily and observe the position of the tube and external bumper. Ensure that the external bumper is not taut against the skin and that the tube can be freely rotated.^{4,13-15}
- Apply an external securement device to gastrostomy tubes that do not have external bumpers.^{14,15}
- Provide daily skin care to keep the insertion site clean and dry, and ensure that the external bumper or securement device is properly positioned. This may help prevent patients from intentional or inadvertent pulling on the tube due to irritation at the insertion site.^{4,15}

- Consider the use of soft wrist restraints, hand mitts, or abdominal binders to limit access to the tube in patients with cognitive impairment, both permanent (e.g., dementia) and transient (e.g., postoperative delirium), or who are otherwise assessed to be at high risk of dislodging their gastrostomy tube.^{4,15}
- Surgeons may consider the use of T-fasteners in children and other patients at high risk for dislodgement. These devices are placed prior to placement of gastrostomy tubes to anchor the stomach to the abdominal wall. These devices do not prevent dislodgement but may prevent disruption of the gastrocutaneous tract and facilitate safe reinsertion of a gastrostomy tube if dislodgement does occur.^{12,15-17}
- Notify the physician immediately for gastrostomy tubes that are suspected or confirmed to be dislodged. Tubes that dislodge within the first 14 days of insertion may need to be replaced surgically. If the gastrocutaneous tract is mature, a new balloon-tipped gastrostomy tube may be inserted at the bedside by qualified personnel.^{4,12}
 - Perform a radiologic contrast study to confirm proper placement of gastrostomy tubes reinserted at the bedside.^{4,13} Air insufflation with radiographic imaging or gastroscopy can also be used to confirm placement.⁴
 - Avoid replacing gastrostomy tubes with catheters or tubes not designed to be used for enteral feeding, such as urinary or gastrointestinal drainage tubes, which lack an external anchoring device. Using these tubes may result in enteral misconnection and tube migration.^{4,14}
 - Provide education to nurses and other clinicians about the design, care, and maintenance of commonly used gastrostomy tubes, including proper use of gastric, jejunal, and balloon ports.^{15,18}
- For gastrostomy tubes with retention balloons, check the volume of water in the balloon weekly. Deflate the balloon with a syringe and reinfuse the designated amount of water—usually 7 to 10 milliliters.¹⁸
- Teach patients and family members proper gastrostomy tube care, including steps to prevent, recognize, and manage dislodgement.¹⁵

CONCLUSION

Dislodgement of gastrostomy tubes is an adverse event that can result in serious harm to patients, up to and including death. Analysis of patient safety events reported to the Authority confirms that dislodgement of gastrostomy tubes is a problem affecting patients of all ages in hospitals across Pennsylvania. Hospitals seeking to reduce this complication are encouraged to implement best practices and strategies to confirm proper positioning of gastrostomy tubes and to prevent, recognize, and manage dislodgement.

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PENNSYLVANIA PATIENT SAFETY ADVISORY

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