

Pa Patient Saf Advis 2017 Dec;14(4).

Data Snapshot: Complications Linked to Iatrogenic Enteral Feeding Tube Misplacements

Author

Susan C. Wallace, MPH, CPHRM

Patient Safety Analyst

Pennsylvania Patient Safety Authority

Introduction

Analysis of enteral feeding tube misplacements* over a six-year period found more than half led to complications, including death. The analysis was prompted by a request from the American Society for Parenteral and Enteral Nutrition (ASPEN), which was looking for current statistics about enteral feeding tube misplacements in Pennsylvania. *Pennsylvania Patient Safety Advisory* articles published in 2006 (/ADVISORIES/Pages/200612_23.aspx)² and 2014 (/ADVISORIES/Pages/201406_78.aspx)³ contained reviews and analyses about misplacements and verification methods.

* Complications after enteral access device (EAD) placement can include misplacement, which is when the tip of the EAD is placed in an anatomical position not intended for the proper administration of enteral nutrition.¹

Methods

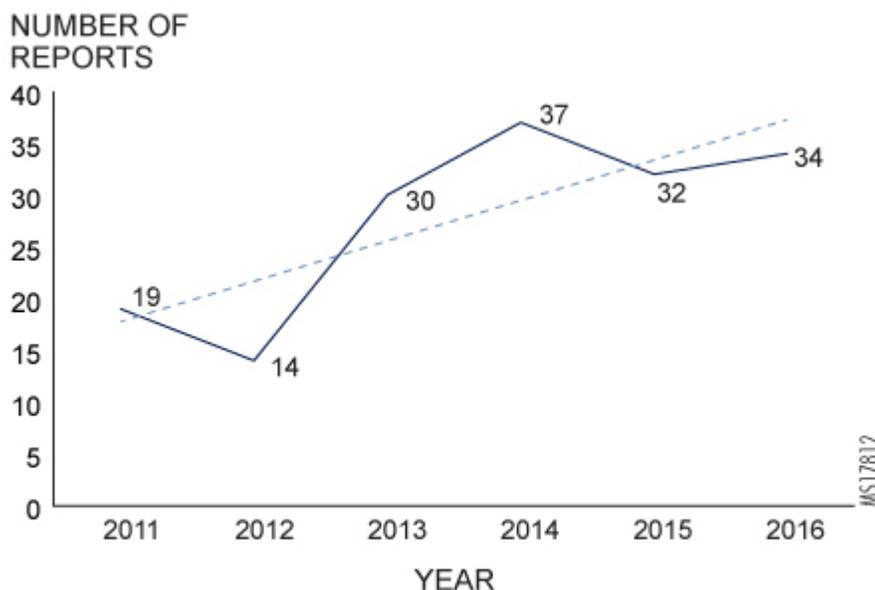
Analysts queried the Pennsylvania Patient Safety Reporting System (PA-PSRS) database to identify events that occurred over a six-year period between January 1, 2011, and December 31, 2016, using the following keywords and derivations: bronch*, covidien, dohoff, esoph*, feeding, kangaroo, keofeed, lung, naso*, placement, pneumo, position, replace, small bore, thorax, and xray. The wildcard character (*) ensured that the search also yielded events containing other word forms (e.g., bronch* returns both bronchus and bronchial). Expanded criteria were used in the analysis of the data, compared with the criteria used for the 2014 publication³ (which reported data from January 2011 through October 2013). The additional criteria included adding naso* to the keyword search and included coiled feeding tubes in the analysis.

Analysts manually reviewed the resulting set of 2,125 event report narratives to identify reports describing misplaced feeding tubes. Excluded were reports in which an inadvertent dislodgement occurred during patient positioning or self-removal by the patient. Event reports were then grouped into related categories by event type, harm score, age, outcomes, and placement verification methods.

Results

Analysts identified 166 enteral feeding tubes misplacements occurring between January 2011 and December 2016 (Figure 1). Of the 166 misplacements, 16 additional events were identified from January 2011 through October 2013 using the expanded criteria, compared with data published in the 2014³ review and analysis.

Figure 1. Number of Iatrogenic Enteral Feeding Tube Misplacements by Year (N = 166)



Note: As reported to the Pennsylvania Patient Safety Authority and occurring between January 1, 2011, and December 31, 2016.

The identified events were submitted in five event type categories with 80.7% (n = 134 of 166) reported in the “complication of procedure/treatment/test” event type, followed by 15.7% (n = 26) reported in the “error related to procedure/treatment/test” event type. All reported events occurred in a hospital. Fifty-six percent (n = 93) were reported as Serious Events, with two (1.2%) resulting in death. The remaining reports (44.0%, n = 73) were of “no harm” or “unsafe conditions.”

Misplacement Types and Outcomes

Misplacements in the lungs occurred in 137 events (82.5%), resulting in a pneumothorax in 88 events (64.2%, 88 of 137). Perforation of the gastrointestinal tract and other body parts occurred in eight events. Other events included coiled feeding tube (n = 13), position unknown (n = 6), and wrong portion of the gastrointestinal tract (n = 2). In the 2014³ review and analysis, events reported to the Authority indicated an increase in the reported events of misplacement. Analysis of this information, including facility interviews, surmised that the increase might have been in part related to a change in feeding-tube brands that was not communicated to staff at various facilities. Therefore, it was suggested that staff should be consistently trained when introducing new brands of enteral feeding tubes. No reports after October 2013 contained event descriptions in which staff were described as being unfamiliar with the brand of feeding tube or any other common themes for the misplacements.

Misplacement Events

Examples of misplacement outcome events are as follows:*

Pneumothorax

Feeding tube placed. X-ray confirmation performed. Received call from radiology stated tube perforated lung, causing a pneumothorax.

Misplaced in lung

Placed a feeding tube. Placed accidentally in the left lower main bronchi. Tube taken out. Two x-rays showed no pneumothorax.

Coiled

Critical x-ray result called to floor. Feeding tube coiled. Recommended repositioning. Placement verified with air bolus. X-ray then performed.

Perforation of the gastrointestinal tract

Patient had nasogastric tube inserted. Difficulty passing it. X-ray showed tube perforated the esophagus.

Position unknown

Nasogastric tube placed in specialty care. Removed when x-ray revealed it to be out of position.

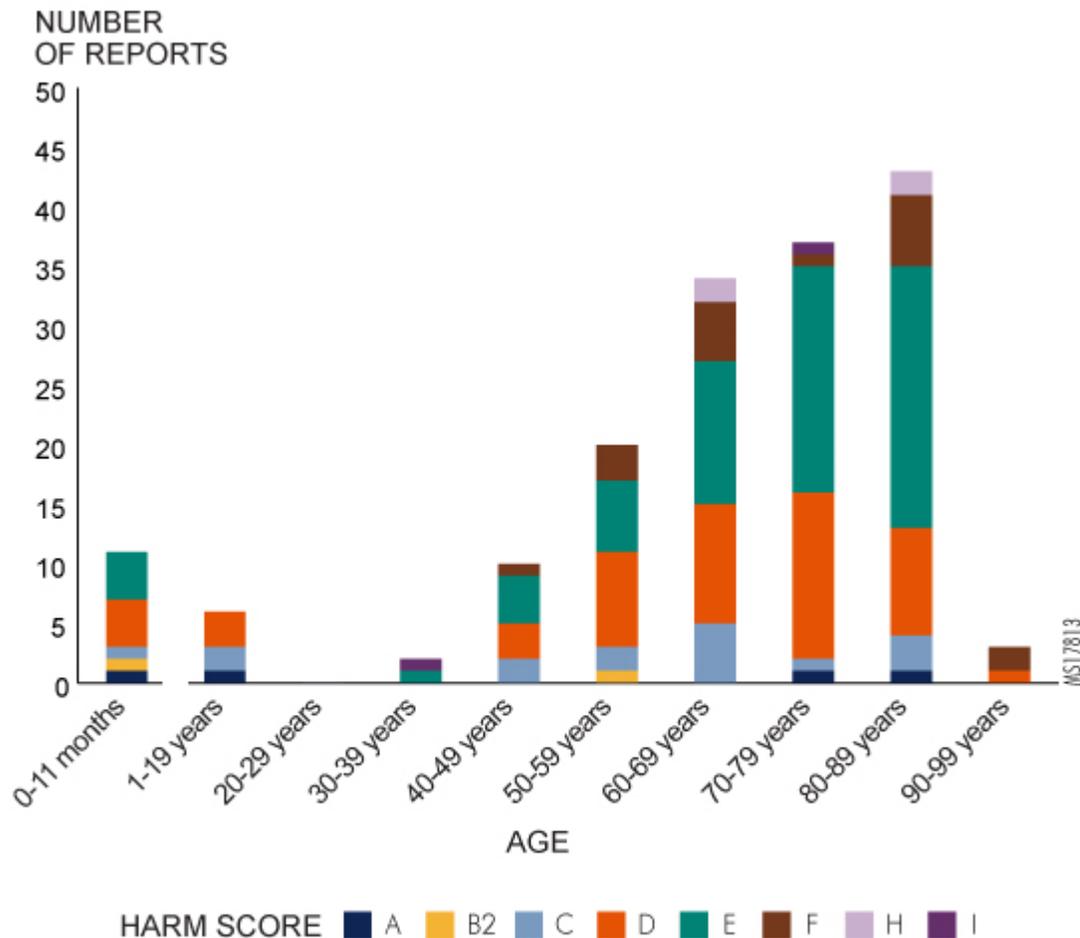
Placed in wrong portion of gastrointestinal tract

Infant's tube was thought to be nasogastric but found to be nasoduodenal at fluoroscopy.

Age

Patients in the age range of 60 through 89 years were affected in most of the reported misplacements (68.7%, n = 114). The largest number of Serious Events (42.2%, n = 70), including one death, were reported for this age range. Newborns and infants (0-11 months) experienced 6.6% (n = 11) of the reported misplacements with 2.4% (n = 4) resulting in temporary harm. On average in the United States, patients age 0-17 years received 23.2% of the enteral nutrition (EN), while patients 65 years or older received 44.6% of the EN.⁴ See Figure 2.

Figure 2. Enteral Feeding Tube Misplacements by Age and Harm Score (N = 166)



Notes: As reported to the Pennsylvania Patient Safety Authority between January 1, 2011, and December 31, 2016.*
 There were no reports of harm score B1 or G.
 * The Pennsylvania Patient Safety Authority Harm Score Taxonomy is available at http://patientsafety.pa.gov/ADVISORIES/Documents/Tool%20PDFs/201503_taxonomy.pdf.

Verification

Misplaced feeding tubes were radiographically verified in 81 of the event descriptions before feeding through the tube began (and so feeding was not started), and radiographs were misinterpreted in 16 of the misplacements. To verify tube location, the American Association of Critical Care Nurses Clinical Resources Task Force endorses measurement of pH aspirate at the bedside and radiographic confirmation, and does not recommend auscultation.⁵

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

Conclusion

Analysis of PA-PSRS data revealed development of a pneumothorax was the most common outcome of iatrogenic enteral feeding tube misplacement for patients 60 through 89 years old. Complications of other misplacements included coiling during placement, perforation, and placement in the wrong portion of the gastrointestinal tract. More than half of the events (56.0%) were reported as Serious Events, including two deaths. Almost half of the misplacements were discovered with a chest x-ray study, which is one of the recommended practices for verification.

Notes

1. Boullata JI, 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> (<http://dx.doi.org/10.1177/0148607116673053>). PMID: 27815525.
2. Confirming feeding tube placement: old habits die hard. PA PSRS Patient Saf Advis. 2006 Dec;3(4):23-30. Also available: http://patientsafety.pa.gov/ADVISORIES/Pages/200612_23.aspx ([/ADVISORIES/Pages/200612_23.aspx](http://patientsafety.pa.gov/ADVISORIES/Pages/200612_23.aspx)).
3. Wallace S. Training suggested when changing brands of enteral feeding tubes. Pa Patient Saf Advis. 2014 Jun;11(2):78-81. Also available: http://patientsafety.pa.gov/ADVISORIES/Pages/201406_78.aspx ([/ADVISORIES/Pages/201406_78.aspx](http://patientsafety.pa.gov/ADVISORIES/Pages/201406_78.aspx)).
4. HCUPnet. Healthcare Cost and Utilization Project. [internet]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); Available: <http://hcupnet.ahrq.gov/> (<http://hcupnet.ahrq.gov/>).
5. Initial and ongoing verification of feeding tube placement in adults (applies to blind insertions and placements with an electromagnetic device). Crit Care Nurse. 2016 Apr;36(2):e8-e13. Also available: <http://dx.doi.org/10.4037/ccn2016141> (<http://dx.doi.org/10.4037/ccn2016141>). PMID: 27037348.



The *Pennsylvania Patient Safety Advisory* may be reprinted and distributed without restriction, provided it is printed or distributed in its entirety and without alteration. Individual articles may be reprinted in their entirety and without alteration, provided the source is clearly attributed.

Current and previous issues are available online at <http://patientsafety.pa.gov> (<http://patientsafety.pa.gov/>).