

PICO Search Assignment Worksheet Name Lisette Romo

Brief description of patient problem/setting (summarize the case very briefly)

An 80-year-old male resident in the long-term care setting with a past medical history of cerebrovascular accident (CVA), cognitive impairment, tracheostomy dependence, nonverbal status, and PEG tube placement was evaluated following a recent emergency department visit for PEG tube dysfunction yesterday. Upon return to the facility, the distal portion of the PEG tube appeared altered and reinforced with tape, and medications were reported to be difficult to administer through the tube. Physical examination demonstrated the PEG tube to be in place, clean, dry, and intact, with mild surrounding erythema at the insertion site. Silver sulfadiazine (Silvadene) was prescribed for local skin irritation. The patient was recommended to undergo gastroenterology follow-up for PEG tube evaluation and necessary replacement; however, coordination of specialty care has been challenging because the patient is bedbound and requires stretcher transportation. Delays in obtaining timely specialty evaluation raised concerns regarding ongoing PEG tube dysfunction, medication administration, and continuity of care.

Search Question:

In adult patients with PEG tubes, does scheduled prophylactic PEG tube replacement compared with replacement after tube malfunction reduce PEG-related complications and emergency department visits?

Question Type: What type of question is this?

☒ **Treatment** ☐ Diagnosis ☐ Prognosis ☐ Screening ☐ Prevalence ☐ Harms

Assuming that the highest level of evidence to answer your question will be meta-analysis or systematic review, what other types of study might you include if these are not available (or if there is a much more current study of another type)?

Please explain your choices.

If systematic reviews or meta-analyses were not available to use, then I would use randomized controlled trials as an alternative source of evidence, especially since they can directly compare the complications of PEG tube malfunctions and solutions. Using prospective cohort studies is another option since it can follow patients over time and can evaluate outcomes such as PEG complications, as this patient has experienced. Retrospective cohort studies can also be applicable since they can assess evidence on tube replacement strategies, complication rates, and prior healthcare utilization data in patients with PEG tubes. Overall, these studies can help provide the best available evidence if higher levels of evidence are limited.

PICO search terms:

P (Population)	I (Intervention)	C (Comparison)	O (Outcome)
Adult patients with PEG	Scheduled	Replacement after	PEG-related

tubes	prophylactic PEG tube replacement	tube malfunction	complications
Long-term care residents with PEG tubes	Routine PEG tube exchange	Reactive replacement	Emergency department visits
Adults requiring long-term enteral feeding	Elective tube replacement	Replacement after tube failure	Hospitalization
Patients dependent on gastrostomy tubes	Preventive tube replacement	Symptom-driven replacement	PEG tube malfunction

Search tools and strategy used:

Please indicate what databases/tools you used, provide a list of the terms you searched together in each tool, and how many articles were returned using those terms and filters.

Database	Search Terms Used	Number of Results	Filters/Limiters Applied	Notes/Observations
PubMed	(percutaneous endoscopic gastrostomy) AND (complications)	2,378	English language, published within the last 10 years.	Used highly specific terms for prophylactic PEG tube replacement, which yielded few results. Search terms were broadened to include PEG complications, gastrostomy tube replacement, and malfunction. The relevant evidence consists of clinical practice guidelines, retrospective cohort studies, and observational

				studies.
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Google Scholar	(PEG tube OR gastrostomy tube OR percutaneous endoscopic gastrostomy) AND (replacement OR exchange) AND (complications OR malfunction OR obstruction)	16,900	Sorted by relevance, English language, and published within the last 10 years.	Broad search terms were applied to retrieve relevant studies relating to PEG tube replacement and associated complications. A large variety of studies were identified.
Cochrane	(percutaneous endoscopic gastrostomy OR gastrostomy tube) AND (complications OR malfunction)	9	Cochrane reviews, English language.	Cochrane yielded limited results with highly specific search terms, with results consistent with high levels of evidence, including systematic reviews.

To answer my PICO question, I used reliable databases including PubMed, Cochrane, and Google Scholar since they provided evidence that helped strengthen my search in their own way. I was able to narrow my article selection by focusing on choosing studies that were most relevant to my PICO question. I mainly focused on finding articles that provided the highest level of evidence that specifically evaluated PEG tube replacement practices, types of tube malfunctions, the rates of complications, and how emergency departments are utilized in long-term care facilities in patients with PEG tubes. This would make the management of patients requiring long-term enteral feeding easier.

Results found:

1. **A dedicated feeding tube clinic reduces emergency department utilization for gastrostomy tube complications** <https://pubmed.ncbi.nlm.nih.gov/35132448/>

Moyer, A. M., Abbitt, D., Choy, K., Grunvald, M. W., Kuo, P. C., & Coogan, S. M. (2022). A dedicated feeding tube clinic reduces emergency department utilization for gastrostomy tube

complications. *Surgical Endoscopy*, 36(9), 6969–6974.
<https://doi.org/10.1007/s00464-022-09065-5>

a. Study Type: Retrospective cohort study

Abstract

Background: Enteral access is required for a variety of reasons from neuromuscular disorders to dysphagia. Gastrostomy tubes (GTs) can be placed endoscopically, surgically, or radiographically and complications include infection, bleeding, leakage and unintentional removal. Routine post-procedural follow-up is limited by inconsistent guidelines and management by different specialty teams. We established a dedicated GT clinic to provide continuity of care and prophylactic GT exchange. We hypothesized that patients followed in the GT clinic would have reduced Emergency Department (ED) utilization.

Objectives: To determine whether participation in a dedicated multidisciplinary gastrostomy tube (GT) clinic, which provided continuity of care and prophylactic tube exchange, was associated with reduced emergency department utilization for gastrostomy tube-related complications compared with standard care.

Methods: A retrospective review of patients who underwent GT placement from January 2010 to January 2020 was conducted. Baseline demographics, indications for GT placement, number and reason for ED visits and utilization of a multidisciplinary GT clinic were studied.

Results: A total of 97 patients were included. The most common indication for placement was dysphagia (88, 91%) and the most common primary diagnosis was head and neck malignancy (51, 51%). The GT clinic is a multidisciplinary clinic staffed by surgeons and residents, dietitians, and wound care specialists and cared for 16 patients in this study. Three patients (19%) in the GT clinic group required ED visits compared to 44 (54%) in the standard of care (SOC) group ($p < 0.05$). There was an average of 0.9 ED visits per patient (range 0-7) in the GT clinic group vs 1.6 ED visits per patient (range 0-20) in the SOC group ($p = 0.34$). Feeding tubes were prophylactically exchanged an average of 7 times per patient in the GT clinic group vs 3 times per patient in the SOC group ($p < 0.05$).

Conclusions: A multidisciplinary clinic dedicated to GT care limits ED visits for associated complications by more than 50%. Follow-up in a dedicated clinic with prophylactic tube exchange decreases ED visits and should be considered at facilities that care for patients with GTs.

Why I chose this article:

I chose this study since it evaluates how patients with gastrostomy tubes are managed, including routine follow-up and prophylactic tube exchange. This study demonstrates that patients enrolled in clinics managed through a multidisciplinary approach had significantly fewer emergency department visits related to complications with their tubes. This type of care coordination is especially important in a vulnerable population and shows that their facility is capable of managing them without complicating the situation with hospitalization. The article also found that the clinic group underwent more prophylactic tube exchanges, which suggests that this type of proactive management can help prevent complications. This article is also relevant to my clinical scenario because the patient had PEG tube

dysfunction, and the study supports that routine monitoring and preventive management can potentially reduce tube-related complications.

Key Points:

- i. Retrospective cohort study evaluating follow-up visits in a multidisciplinary gastrostomy tube (GT) clinic reduced emergency department utilization
- ii. Patients followed in the GT clinic had significantly fewer ED visits than patients receiving standard care
- iii. Patients in the GT clinic had more prophylactic tube exchanges versus standard care patients (7 vs. 3 exchanges per patient)
- iv. To focus on continuity of care, the clinic included surgeons, residents, dietitians, and wound care specialists for proactive tube management.

2. Improving Post-procedure Outcomes With Clinical Care Pathway for Enteral Access

<https://pubmed.ncbi.nlm.nih.gov/37203186/>

Miller, S. M., Abou-Azar, S., Owusu, K. A., Boustany, A., Moyer, A. M., Coogan, S. M., & Choy, K. (2023). Improving post-procedure outcomes with clinical care pathway for enteral access. *The American Surgeon*, 89(12), 5765–5770. <https://doi.org/10.1177/00031348231177914>

- a. Study Type: Retrospective cohort study

Abstract

Background: Enteral access, including PEG tubes, nasogastric tubes, and other feeding devices, is required for a variety of conditions ranging from neuromuscular disorders to dysphagia. Routine post-procedural follow-up for patients with enteral access devices is limited by inconsistent guidelines and management by different specialty teams. Patients discharged with enteral nutrition through an enteral access device have been shown to have increased hospital readmissions, with approximately 20.5% of 30-day readmissions being directly EN-related, and 44.6% of those involving enteral access device issues such as malfunction, dislodgement, or obstruction. The AGA has recommended a multidisciplinary team approach after enteral access placement, including dietitians for formula choice and delivery method, and nurses and advanced practice clinicians for tube site assessment and troubleshooting. Despite these recommendations, no standardized clinical pathway existed at the study institution before the EACP implementation.

Objective: To evaluate whether implementation of a structured Enteral Access Clinical Pathway (EACP) could improve outcomes for patients with enteral access devices. Specifically, sought to determine whether the pathway would increase nutrition consultation rates while reducing emergency department re-presentations, hospital readmissions, and overall hospital length of stay following enteral access procedures.

Methods: This retrospective pre-post quality improvement cohort study was conducted within a U.S. health system and included all patients with enteral access devices. Patients were categorized into three groups: short-term access (STA), which included nasogastric, nasojejunal, and other temporary feeding tubes; long-term access (LTA), which included PEG tubes, surgical gastrostomy tubes, and other percutaneous enteral access devices; and short-to-long-term conversions (SLT), which included patients transitioning from temporary to permanent enteral access. The intervention consisted of implementation of an Enteral Access Clinical Pathway (EACP), a standardized clinical pathway that incorporated nutritionist consultations, structured discharge planning, and follow-up protocols. Outcomes in the baseline group, consisting of patients treated during the six months before EACP implementation ($n = 2,553$), were compared with outcomes in the performance group, consisting of patients treated during the six months following EACP implementation ($n = 2,419$), for a total sample size of 4,972 patients. Primary outcomes included nutrition consultation rates, emergency department re-presentation rates, hospital readmission rates, and hospital length of stay.

Results: The baseline cohort consisted of 2,553 patients, while the performance cohort consisted of 2,419 patients. Nutrition consultation rates increased from 48.0% in the baseline group to 52.4% in the performance group ($P < .01$), representing a 9.2% relative increase. Emergency department re-presentations decreased from 42.6% to 31.9% ($P < .001$), representing a 25.1% relative reduction. Hospital readmissions decreased from 41.6% to 31.0% ($P < .001$), representing a 25.5% relative reduction. Overall, the Enteral Access Clinical Pathway (EACP) was associated with significant improvements in nutrition consultation rates and significant reductions in both emergency department re-presentations and hospital readmissions. All primary outcomes reached statistical significance.

Conclusion: EACP may increase the likelihood of both expert-driven nutritional support and effective discharge planning for hospitalized patients with enteral access devices. The structured clinical pathway was associated with clinically and statistically significant reductions in both ED re-presentations and hospital readmissions.

Why I chose this article:

I decided to choose this article since it assessed the efficacy of the Enteral Access Clinical Pathway (EACP), which is a standardized post-procedure program that consists of nutritional consults and arranging disposition and follow-up visits for patients with various types of enteral devices. The study demonstrated that through this program, there were reductions in the amount of hospitalizations and emergency department utilization, and this is helpful since it is a structured approach to discharge care. This is particularly relevant to my clinical scenario because the patient was bedbound and presented with PEG tube malfunction, requiring not only long-term enteral nutrition but also coordination of transportation and follow-up care. The article also supports routine monitoring and follow-ups to identify any type of tube-related issues like an obstruction or dislodgement, before they become more serious, and addressing these issues early on can prevent emergencies requiring hospitalization. Overall, this study supports the importance of using standardized care methods to reduce complications and improve outcomes.

Key Points:

- i. Retrospective cohort study evaluating the impact of an Enteral Access Clinical Pathway (EACP) on patient outcomes
- ii. 4,972 patients with enteral access devices, including PEG tubes, surgical gastrostomy tubes, and temporary feeding tubes
- iii. Nutrition consultation rates increased significantly after EACP implementation
- iv. Emergency department re-presentations decreased by 25.1% following EACP implementation
- v. Hospital readmissions decreased by 25.5% following EACP implementation

3. Causes of readmissions for patients discharged on enteral nutrition

<https://pubmed.ncbi.nlm.nih.gov/35040141/>

Palchaudhuri, S., Mehta, S. J., Snider, C. K., Parsikia, A., Hudson, L., Compber, C., Lewis, J. D., Wu, G. D., & Pickett-Blakely, O. (2022). Causes of readmissions for patients discharged on enteral nutrition. *JPEN: Journal of Parenteral and Enteral Nutrition*, 46(7), 1672–1676. <https://doi.org/10.1002/jpen.2331>

- a. Study Type: Retrospective cohort study

Abstract

Background: Patients discharged with enteral nutrition (EN) through an enteral access device (DCENs) are noted to have increased hospital readmissions, but data on the readmission causes are limited. We assessed the proportion of these readmissions attributed to EN and determined the contributing factors to readmissions.

Objective: To determine the proportion of hospital readmissions among patients discharged on enteral nutrition that were directly related to enteral nutrition and to identify the factors contributing to those readmissions, including enteral access device complications, gastrointestinal symptoms, and electrolyte abnormalities.

Methods: Using electronic health record data, we conducted a retrospective cohort study of all hospital encounters in an academic, urban hospital from July 2017 to December 2019 with discharge with EN to find all unplanned readmissions at the same hospital within 90 days. For each readmission, we evaluated through chart review whether discharge documentation identified the primary cause of readmission to be EN-related and evaluated for EN-related plan adjustments upon discharge.

Results: Over the 30-month period, there were 224 and 442 readmissions within 30 and 90 days for DCENs, respectively. EN-related readmissions accounted for 20.5% of 30-day readmissions and 16.7% of 90-day readmissions. Among these, 44.6% (33 of 74) documented enteral access device issues, 40.5% (30 of 74) cited gastrointestinal symptoms that the team attributed to EN, and 14.9% (11 of 74) cited sodium imbalance. The EN plan was changed in 97.3% (72 of 74) of EN-related readmissions and 32.3% (119 of 368) of EN-unrelated admissions. 52.0% of 90-day readmissions were within 90 days of initiating EN.

Conclusion: 20.5% of readmissions for DCENs are related to EN, with 52.0% occurring within 90 days of initiating EN. Quality improvement interventions targeting postdischarge care may decrease hospital readmissions in this high-risk and medically complex patient population.

Why I chose this article:

I selected this article since it evaluates hospital readmissions in patients who are discharged on enteral nutrition. An important finding was that enteral access device complications accounted for 44.6% of EN-related readmissions, highlighting the significant impact that feeding tube issues can have on patient outcomes. The study also found that over half of readmissions occurred within 90 days of initiating enteral nutrition, emphasizing the importance of close monitoring and follow-up during the post-discharge period. This information is particularly relevant to my clinical scenario because the patient was discharged back to the long-term care facility after hospitalization for a PEG tube-related complication, placing him at risk for future hospital utilization if additional tube-related complications occur. Furthermore, the study reported that nearly all enteral nutrition-related readmissions required changes to the patient's nutrition plan, suggesting that earlier intervention may help prevent avoidable hospitalizations. Overall, this article supports the importance of proactive management, structured follow-up, and timely intervention for patients with enteral feeding devices.

Approximately 1 in 5 hospital readmissions were directly related to enteral nutrition or enteral access device complications.

Key Points:

- i. Retrospective cohort study that evaluated the reason for hospital readmissions for patients who are discharged on enteral nutrition.
- ii. Over half of patients who were readmitted (52%) returned to the hospital within 90 days of starting enteral nutrition.
- iii. Almost half (44.6%) of enteral nutrition-related readmissions were due to feeding tube complications.
- iv. Nearly all (97.3%) of feeding tube-related readmissions resulted in making changes to the patient's nutrition plan.

4. Safety of endoscopic gastrostomy tube placement compared with radiologic or surgical gastrostomy: nationwide inpatient assessment <https://pubmed.ncbi.nlm.nih.gov/32931781/>

Kohli, D. R., Kennedy, K. F., Desai, M., & Sharma, P. (2021). Safety of endoscopic gastrostomy tube placement compared with radiologic or surgical gastrostomy: Nationwide inpatient assessment. *Gastrointestinal Endoscopy*, 93(5), 1077–1085.e1. <https://doi.org/10.1016/j.gie.2020.09.012>

- a. Study Type: Retrospective cohort study

Abstract

Background: A gastrostomy tube is often required for inpatients requiring long-term nutritional access. We compared the safety and outcomes of 3 techniques for performing a gastrostomy: percutaneous endoscopic gastrostomy (PEG), fluoroscopy-guided gastrostomy by an interventional radiologist (IR-gastrostomy), and open gastrostomy performed by a surgeon (surgical gastrostomy).

Objective: To compare the safety and clinical outcomes of three gastrostomy tube placement techniques: percutaneous endoscopic gastrostomy (PEG), fluoroscopy-guided radiologic gastrostomy (IR-gastrostomy), and open surgical gastrostomy using a nationally representative U.S. inpatient database. adverse events, 30-day nonelective readmission rates, and inpatient mortality associated with each technique were evaluated.

Methods: Using the Nationwide Readmissions Database, we identified hospitalized patients who underwent a gastrostomy from 2016 to 2017. They were identified using the International Classification of Diseases, 10th Revision, Procedure Coding System. The selected patients were divided into 3 cohorts: PEG (0DH64UZ), IR-gastrostomy (0DH63UZ), and open surgical gastrostomy (0DH60UZ). Adjusted odds ratios for adverse events associated with each technique were calculated using multivariable logistic regression analysis.

Results: Of the 184,068 patients meeting the selection criteria, the route of gastrostomy tube placement was as follows: PEG, 16,384 (53.7 ± 29.0 years); IR-gastrostomy, 154,007 (67.2 ± 17.5 years); and surgical gastrostomy, 13,677 (57.9 ± 24.3 years). Compared with PEG, the odds for colon perforation using IR-gastrostomy and surgical gastrostomy, respectively, were 1.90 (95% confidence interval [CI], 1.26-2.86; $P = .002$) and 6.65 (95% CI, 4.38-10.12; $P < .001$), for infection of the gastrostomy 1.28 (95% CI, 1.07-1.53; $P = .006$) and 1.61 (95% CI, 1.29-2.01; $P < .001$), for hemorrhage requiring blood transfusion 1.84 (95% CI, 1.26-2.68; $P = .002$) and 1.09 (95% CI, .64-1.86; $P = .746$), for nonelective 30-day readmission 1.07 (95% CI, 1.03-1.12; $P = .0023$) and 1.13 (95% CI, 1.06-1.2; $P = .0002$), and for inpatient mortality 1.09 (95% CI, 1.02-1.17; $P = .0114$) and 1.55 (95% CI, 1.42-1.69; $P < .0001$).

Conclusion: Placement of a gastrostomy tube (PEG) endoscopically is associated with a significantly lower risk of inpatient adverse events, mortality, and readmission rates compared with IR-gastrostomy and open surgical gastrostomy.

Why I chose this article:

I selected this article since it assesses the outcomes in patients who are undergoing surgery for gastrostomy tube placements, and is unique since it compares three common techniques for placement. It found that PEG placement was associated with lower rates of overall hospitalizations, complications, and inpatient mortality in comparison to when it is done surgically. This is relevant to my clinical scenario since the patient had a PEG tube placement and was then hospitalized for a tube-related complication, so the type of tube might matter to avoid complications in patients. Using PEG placement reduced complications such as gastrostomy site infections, colonic perforations, and GI bleeds requiring transfusion. Moreover, patients who require feeding tubes need long-term management and can require future tube replacement or intervention, so knowing what placement method is used is necessary. The article was also reliable since it was conducted on a large sample size of 184,068 patients. Based on these findings, there is strong support for PEG tubes as a safe long-term option that may reduce hospitalization.

Key Points:

- i. Using PEG placement versus surgical gastrostomy placement reduced hospital readmission rates in 30 days.
- ii. Radiologic and surgical gastrostomy were associated with higher rates of colon perforation, site infections, and inpatient mortality compared with PEG placement.
- iii. This study was conducted on 184,068 patients, which is considered the largest U.S study to compare outcomes amongst gastrostomy placement techniques.

What is the clinical “bottom line” derived from these articles in answer to your question?

Overall, these articles strongly support taking a proactive approach in management for PEG tubes, scheduling patients for follow-ups, involving multispecialties, and prompting routine surveillance on the patients instead of just waiting for complications to happen. Two articles demonstrated ways to reduce overuse of resources, such as emergency department utilization and readmissions, through having a dedicated feeding tube clinic, as well as implementing the Enteral Access Clinical Pathway (EACP). (Moyer et al. 2022, Miller et al. 2023) This applies to real-world scenarios since long-term facility statistics can decrease if the patient gets sent out to the emergency department. Also, it was reported by Palchaudhuri et al. (2022) that the majority of readmissions were due to feeding tube issues, and they could also be prevented with intervention and closer follow-up. This is also clinically significant since it became difficult to push medications through the feeding tube without having to crush them up for the patient in the clinical scenario, and this could potentially lead to another readmission. Lastly, the last article also highlighted that the kind of placement also mattered for the type of outcome the patient will have; for example, Kohli et al. (2021) were in favor of PEG placement due to less risk compared to surgical gastrostomy placement. Therefore, as a collective, these studies implicated that PEG tubes require a thorough and multifaceted approach for enteral feeding to prevent complications leading to emergency department visits and hospital readmission.

Although these interventions can improve outcomes, actually implementing them might be a challenge, particularly within underserved urban communities. The patient in this case was an elderly long-term resident with a highly complex medical history of CVA leading to cognitive impairment, tracheostomy, and PEG tube use. Patients with similar medical complexity, such as this patient, require caregivers, all around the clock nursing staff, and proper coordination with specialists for ongoing management. So if there are any barriers, such as limited access to gastroenterology services, issues with transportation in bed-bound patients, or healthcare staffing shortages, then this can delay access to proper routine care and prevention of complications. During my clinical rotation, I observed that the patient population served by the long-term care facility includes patients from underserved communities, so there are potentially more barriers, including socioeconomic challenges. This can affect managing PEG tube complications. Therefore, managing a patient with PEG tubes should be tailored differently to each patient's individual needs and availability of resources to reduce barriers to access to care.

