Practice Patterns of Percutaneous Endoscopic Gastrostomy Tube Placement in Acute Stroke: Are the Guidelines Achievable?

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Objectives: Our objectives were to evaluate trends in percutaneous endoscopic gastrostomy (PEG) tube placement rate and timing in acute stroke patients. We hypothesized that noncompliance with clinical practice guidelines for timing of tube placement and an increase in placement occurred because of a decrease in length of hospital stay. *Methods:* We conducted a retrospective observational study of archival hospital billing data from the Florida state inpatient healthcare cost and utilization project database from 2001 to 2012 for patients with a primary diagnosis of stroke. Outcome measures were timing of PEG tube placements by year (2006-2012), rate of placements by year (2001-2012), and length of hospital stay. Univariate analyses and simple and multivariable logistic regression analyses were conducted. *Results:* The timing of gastrostomy tube placement remained stable with a median of 7 days post admission from 2006 through 2012. The proportion of tubes that were placed at or after 14 days and thereby met the guideline recommendations varied from 14.09% in 2006 to 13.41% in 2012. The rate of tube placement in stroke patients during the acute hospital stay decreased significantly by 25% from 6.94% in 2001 to 5.22% in 2012 ($P < .0001$). The length of hospital stay for all stroke patients decreased over the study period ($P < .0001$). *Conclusions:* The vast majority of PEG tube placements happen earlier than clinical practice guidelines recommend. Over the study period, the rate of tubes placed in stroke patients decreased during the acute hospital stay despite an overall reduced length of stay. **Key Words:** Stroke—gastrostomy—clinical practice pattern—guideline adherence.

Introduction

Percutaneous endoscopic gastrostomy (PEG) tubes are used to support nutrition and hydration in acute stroke patients. Commonly considered a low-risk procedure, PEG tubes, however, are associated with short- and long-term complications.[1-6] Evidence exists linking PEG tube placement in the acute stage with worse outcomes in comparison to nasogastric (NG) feeding tubes, in terms of mortality, functional status, and potential for tube removal.[7] Clinical practice guidelines, therefore, provide recommendations for the timing and indication of PEG tube placements in acute stroke patients. The American Heart Association/American Stroke Association (United States), the National Collaborating Centre for Acute Care (United Kingdom), the German Society for Clinical Nutrition (Germany), and the German Society for Neurology (Germany) all recommend PEG tube placement in stroke patients with a given medical indication after 14-28 days.[8-11]

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Further, the Scottish Intercollegiate Guidelines Network (Scotland), the German Society for Clinical Nutrition (Germany), the German Society for Neurology (Germany), and the European Society for Clinical Nutrition and Metabolism (Europe) all recommend placement of PEG tubes for patients with an anticipated prolonged need for enteral nutrition for more than 28 days.[6,10-12]

Compliance with these guidelines seems to be especially challenging with the last decade's increased tendency for shorter hospitalizations due in part to widespread changes in the payment for health care. Previous research supports the hypothesis that a decrease in the average hospital length of stay (LOS) can lead to changes in practice patterns.[13] In terms of PEG tube placements, one can speculate that a shorter LOS for stroke patients might increase the pressure on clinical decision making for PEG tube placement. In 2010, the average LOS for stroke patients was 6.1 days in the United States[14] and was therefore notably below the recommended timing for PEG tube placements of 14-28 days.

The aim of our study was to evaluate current practice and trends in PEG tube placement rate and timing in order to identify discrepancies with guideline recommendations and to identify the potential to improve health care for acute stroke patients. Considering that stroke patients are usually in the hospital for less than a week, we hypothesized that (1) the timing of PEG tube placement happens earlier than clinical practice guidelines recommend and (2) placement occurs near the end of the hospital stay. We further hypothesized that an increase in PEG tube placement in acute stroke patients has occurred.

Methods

We conducted a retrospective analysis of hospital discharge billing data from the Healthcare Cost and Utilization Project, Florida State Inpatient Database, from 2001 to 2012. This dataset includes all inpatient discharge records from acute care community hospitals. Discharge records were included for patients with a primary diagnosis of stroke (International Classification of Diseases, Ninth Revision, Clinical Modification [ICD-9-CM] codes of 434.xx for ischemic or 431.xx for hemorrhagic stroke). These codes and code 436.xx were proven to be most accurate and highly specific.[15] Since 2004, the code 436.xx was removed and reindexed to code 434.91. Thus, we excluded 436.xx for all years for consistency while accepting that stroke patients coded with 436.xx before 2004 may be underrepresented in our sample. PEG tube placement during a hospital stay should be coded through an ICD-9-CM procedure code; however, in rare occasions, a current procedure terminology (CPT) code might be used instead. Because CPT codes were not available in the analyzed database, we calculated the estimated amount of missed PEG tube placements by comparing CPT and ICD-9-CM procedure codes for PEG tube placement in Medicare data from 2012, which included both CPT and ICD-9-CM procedure codes. We found that in Medicare 2012, 2.5% of all PEG tube placements were missed by using ICD-9-CM procedure codes only. Acknowledging this finding as a limitation of our study, we felt comfortable identifying PEG tube placement in the Healthcare Cost and Utilization Project databases through the ICD-9-CM procedure code 43.11 only, because we anticipated that we will be able to identify the vast majority, 97.5%, of all PEG tube placements.

In addition to the comparison of CPT and ICD-9 procedure codes, we assessed whether differences in the number of diagnosis and procedure codes between the years may have caused an ascertainment bias. The years 2001-2005 only included 10 diagnosis and 10 procedure codes, whereas 2006-2012 included 31 diagnosis and procedure codes. We compared the frequency of PEG tube placements by taking all 31 codes and by taking only the first 10 codes. The difference for the overall PEG placement rate when comparing these 2 approaches was between .04% and .08%, and was therefore considered negligible.

Discharge records were analyzed for demographic characteristics (age, sex, and race), stroke type (ischemic or hemorrhagic stroke), comorbidities (Charlson Comorbidity Index), death during hospital stay, and acute hospital LOS information. The Charlson Comorbidity Index is a validated method to predict 1-year mortality based on the presence and weighting of comorbid conditions as retrieved from medical chart reviews.[16] We used the enhanced, most recently updated ICD-9-CM coding algorithms for the Charlson Comorbidity Index for which good-to-excellent discrimination in the prediction of in-hospital mortality has been shown.[17,18] Patients who died during the hospital stay remained in the analyses. Outcome measures were (1) timing of PEG tube placement (number of days after admission, number of days before discharge, and timing of placement in relation to total LOS); and (2) frequency of PEG tube placement. As a limitation, the timing of PEG tube placement could only be assessed from 2006 to 2012 because information on the day of procedures has only been included since 2006.

Univariate analyses for demographic and clinical information and timing of PEG tube placement were conducted. We determined differences in variables with bivariate comparisons of the first (2001 or 2006) and last year (2012) with the chi-square test or the Wilcoxon rank-sum test, where appropriate. Simple and multivariable logistic regression analyses determined the influence of the year as the main independent variable on the rate of PEG tube placement. To determine the final multivariable regression model, we used manual backward selection regression with increased Akaike information criterion and P values of the covariates greater than .05