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Physician opinions on decision making for percutaneous endoscopic gastrostomy (PEG) feeding tube placement

Theresa A. Fessler[1,2] · Timothy B. Short[3] · Kate F. Willcutts[1] · Robert G. Sawyer[4]

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Abstract

Background Percutaneous endoscopically placed gastrostomy (PEG) tubes are useful for long-term enteral nutrition; however, they are associated with lack of benefit for patients with advanced dementia, at end of life, and for some stroke patients with early regain of swallowing function. We surveyed physician opinions on decision making with the aim to identify factors that can lead to inappropriate PEG placement, as a first step of a quality improvement initiative to prevent inappropriate PEG placements at our facility.

Methods A survey was distributed to 231 physicians, with questions about discussion topics, contraindications, responsibilities, and practices in decision making for PEG placement. Five-point Likert scales were used for most responses.

Results Of 62 respondents, the majority were general surgeons (51.6%) and neurologists (30.6%). Levels of agreement were very low that PEG placement is contraindicated in advanced dementia (> 56% disagreed) and at end of life (55% disagreed) with scores of 2.4 and 2.5 (out of 5), respectively. Agreement level was low (score of 2.85) for delaying PEG for stroke patients by at least 2 weeks. Agreement was high for the discussion topics, for allowing 1–7 days for processing information, and for consulting the nutrition service. Over 98% of respondents chose primary team and 58% chose both primary and endoscopy teams as being responsible for discussions with patients and care partners in the decision-making process.

Conclusions Greater awareness is needed of the lack of benefit of PEG feeding in advanced dementia, at end of life, and for some stroke patients with early regain of swallow function. Disagreement exists as to whether the primary team and endoscopist share in the responsibility for discussions in decision making for PEG placement.

Keywords Percutaneous endoscopic gastrostomy (PEG) · Enteral nutrition · Decision making · Stroke · Advanced dementia · End of life

Common reasons for long-term tube feeding (one or more months) with percutaneous endoscopically placed gastrostomy feeding tubes (PEG) are dysphagia associated with head and neck cancers, stroke, and chronic neurodegenerative conditions. Members of the nutrition support service at the University of Virginia hospital noticed cases in which PEG tubes were not used for more than a few days or weeks at our facility, therefore, we examined the decision-making process as a first step in a quality improvement initiative to prevent inappropriate PEG placement.

General guidelines for the appropriate use of PEG feeding tubes have been published [1–3]. The American Geriatrics Society, the American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.), the European Society for Parenteral and Enteral Nutrition (E.S.P.E.N.), the American Academy of Hospice and Palliative Medicine, and others have published statements that address the lack of benefit of feeding

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✉ Theresa A. Fessler
taf4c@virginia.edu

[1] Department of Nutrition Services, University of Virginia Health System, Charlottesville, VA 22903, USA

[2] Morrison Healthcare, University of Virginia Health System, Charlottesville, VA 22903, USA

[3] Department of Palliative Care, University of Virginia Heath System, Charlottesville, VA 22903, USA

[4] Department of Surgery, Western Michigan University, Kalamazoo, MI 49008, USA

tubes for end-of-life care, and for patients with advanced dementia [4, 5]. Literature shows that a large percentage of physicians do not agree with or are unaware of these guidelines [6–8]; while some physicians do agree with the guidelines [6, 7, 9] and differences exist among subspecialties [9, 10].

Many stroke patients regain the ability to swallow within 2–3 weeks, thus it is preferable to use temporary nasogastric (NG) tubes initially for enteral feeding, and delay PEG placement until 14–28 days after the stroke [2, 11–13]. The 2018 American Heart Association/American Stroke Association guidelines are worded less precisely, stating to use an NG tube within the first 7 days, and place a PEG in patients with longer (> 2–3 weeks) anticipated inability to swallow safely [14]. Experience at our institution confirms reports in the literature [15, 16] that PEG feeding tubes are often placed earlier than the recommended ≥ 14 days and that planning for discharge to rehabilitation facilities often drives this process.

Guidelines have been published for optimal communication and decision making for the placement of long-term feeding tubes [2, 3, 17] and for clinical decisions in intensive care units in general [18]. Several studies show that there is a need for improvements in communication between healthcare teams and patients and their caregivers during the decision-making process for PEG feeding tubes [6, 19–22]. In the mid-1990s, a large percentage of patients and surrogates reported receiving inadequate information about the PEG tube, method of placement, feeding process, potential complications, and the future clinical impact [19]. In interviews conducted in 2003 and 2004, only 4 of 16 patients and 10 out of 27 care partners felt they received sufficient information about the decision for PEG [20]. A survey of family members of persons who died from dementia revealed that discussions about the feeding tube placement were lacking for 13.7%, and 41.6% said the discussion was shorter than 15 min [21]. In two teaching hospitals in North Carolina, only 10% of physicians surveyed reported shared decision making for PEG feeding tubes placed from December 2000 to May 2002 [22]. Some researchers have advocated for separate teams or services in hospitals to assist and improve decision making for placement of PEG feeding tubes [2, 23–25].

At the University of Virginia Health System, PEG tubes are placed by both the surgical and medical gastroenterology endoscopy services and are sometimes placed during other surgical procedures. Our survey focused on general surgeons, neurologists, and neurosurgeons with the aim to determine their extent of agreement with literature-based guidelines on decision making for PEG placement, and to identify other factors that may contribute to inappropriate PEG placement. Although gastrostomy tubes can be placed by several methods, including surgical, radiologic, or endoscopic, we limited the scope of this project to percutaneous endoscopic as it is the most frequently performed at our hospital. Our hypothesis was that some discrepancy exists regarding use of PEG feeding at end of life and in the timing of PEG placements for stroke patients.

Materials and methods

In an interdisciplinary meeting, a general surgeon who places PEG tubes, a palliative care physician, three registered dietitians (RD), a speech language pathologist (SLP), and a neurology registered nurse (RN) case manager derived consensus on optimal decision-making practices for PEG placement. Building on published literature and experience, the work group created a list of guidelines from which survey questions were developed covering 4 main areas: topics for discussion with patients and families, practice items, indications and contraindications, and who is responsible for leading the discussions in the decision-making process for PEG feeding tubes.

Survey

IRB approval or written consent was not necessary, as participation in the survey was on a completely voluntary basis, indicated by clicking on an "I agree" box before answering survey questions. Participants had the option to withdraw at any point, responses were kept confidential, and data were reported only in the aggregate.

Refer to Table 1 "Survey Questions" for the list of questions and answer options. For questions regarding discussion topics and current practices, indications, contraindications, and the use of a multidisciplinary team for decisions on PEG placement, answer options were on 5-point Likert scales ranging from "*Never" or "Disagree"* to *"Always*" or "*Completely Agree,"* and some had an option for "*Not applicable to my practice*" (NA). For the questions that addressed which clinicians are responsible for discussions with patients and families or care partners during decision making, respondents could select one or more options.

In December 2016 and January 2017, surveys were emailed to 231 physicians, which included general surgery, neurology, and neurosurgery groups at the University of Virginia Health System (UVAHS), using Question Pro™ ©2017 (Question Pro V17.9 university department sub-account with UVAHS). One to two days prior to survey distribution, messages were emailed to the physicians informing them of an upcoming survey that would take less than 5 min to complete. Repeat surveys were emailed to 20 neurosurgery residents and 58 neurologists who did not respond to the first survey. Results were printed on February 28, 2017.

Table 1 Survey questions

1. Please indicate your current area of specialty, or if applicable, current rotation. If your answer is "other" please fill in text box [Neurology, Neurosurgery, General Surgery, Other (please specify) _____]
2. Please indicate your current status (if "other" please fill in text box) [Resident 1st year, Resident 2nd year, Resident 3rd year, Resident 4th year, Chief Resident, Fellow, Attending, Other (please specify)]
3. Please indicate your current practice regarding *discussions that you have* with patients and or family members/care partners, prior to making decisions to place PEG feeding tubes [Never, Almost never, Sometimes, Almost always, Always, or Not applicable to my practice]
I ask if they have questions or concerns about PEG feeding
I ask if they have been instructed on the tube feeding regimen
I ask if they have been instructed on tube and site care
I discuss potential quality of life changes that may occur for patients
I discuss potential quality of life changes that may occur for the patient's family and /or caregivers
I inform that oral intake can still be possible for comfort in applicable situations
I inform that tube feeding can be discontinued when desired by the patient and or family/care partners
I inform that the tube itself can be removed if desired, approximately 1 month after placement
I explain what may happen if PEG tube is not placed
4. Please indicate your level of agreement with the following statements regarding patients who are unable to eat orally [Disagree, Somewhat disagree, Neither agree nor disagree, Somewhat agree, Completely agree]
PEG feeding tubes are indicated only if congruent with goals of care as determined by the primary healthcare team based on the patient's prognosis and wishes
PEG feeding tubes are contraindicated if a competent patient decides it is not in his or her best interest based on quality of life and prognosis
PEG feeding tubes are contraindicated for patients with advanced dementia
PEG feeding tubes are contraindicated for patients on hospice care, or comfort-care only
A multidisciplinary "PEG team" would be helpful to improve patient and caregiver satisfaction to help with decisions on placing PEG feeding tubes
I would seek assistance of a multidisciplinary "PEG team" to help with decision making if such a team were available
5. Discussions with patients and/or family /care partners about the effect that the feeding tube has, or does not have, on overall prognosis is the responsibility of? (select all that apply)
The primary team managing the patient's care
The endoscopist or endoscopy team who will be placing the PEG tube
6. Discussions about quality of life and ethical issues regarding PEG placement are the responsibility of? (select all that apply)
The primary team in charge of patient's care
The endoscopist or endoscopy team who will be placing the PEG tube
A clergy member or chaplain
An ethics committee
7. Please indicate how you currently practice regarding decisions for placement of PEG feeding tubes [Never, Almost never, Sometimes, Almost always, Always, Not applicable to my practice]
For stroke patients, I delay decision for PEG feeding tube by at least 2 weeks, if possible, after oropharyngeal dysphagia is diagnosed, because dysphagia might resolve during that time
After the initial discussion about PEG placement, I allow patients and/or families/care partners a 1-to-7-day time period to process information before the decision is made to place the PEG feeding tube or not
For patients with normal ability to swallow but who are just eating poorly, I order a nutrition consult to evaluate specific reasons why food intake is poor prior to deciding on placement of a PEG feeding tube
I consult ethics committee if any unresolved concerns exist that a PEG feeding tube might not be in the patient's best interest

Analysis

Demographic and survey response data were reported as percentages of the total, and for each of the 4 sub-groups: general surgeons, neurosurgeons, neurologists, and other physicians. "Level of agreement" scores were reported as means and standard deviations of aggregated data based on the answer frequencies for the 5-point Likert scales. For data analysis on levels of agreement, the responses of "not applicable to my practice" (NA) were excluded from calculations. The aggregated data were initially generated by Question Pro™ and later analyzed by IBM SPSS Statistics version 24 software. For post hoc analysis of differences between the 4 sub-groups, and between residents and attending physicians, frequency data were analyzed by one-way analysis of variance using Java SPSS Writer v1.84.

Results

The overall survey response rate was 26.8% (62/231); and for the sub-groups: 28.3% for general surgeons (32/113), 26% for neurologists (19/72); and 10% for the neurosurgeons (4/40). The survey was viewed by 91 individuals, of which 84 started and 62 finished, for a completion rate of 73.8%. The average time taken to complete the survey was 4 min. The 62 respondents consisted of 32 general surgeons, 4 neurosurgeons, 19 neurologists, and 7 who identified themselves as "other." Twenty-five (40.3%) respondents were attending physicians and 35 (56.5%) were residents (Table 2).

For 6 of the 9 discussion topics queried, levels of agreement were very high, with scores ranging from 3.95 to 4.63, and the remaining 3 had scores ranging from 3.07 to 3.52. Table 3 lists the discussion topics and average levels of agreement for each. As opposed to the aggregated data represented above, when the 4 physician sub-groups were compared, there were no significant differences in answers for 8 of the 9 discussion items (Supplementary Appendix 1).

Mean agreement scores were very low, at 2.44 and 2.52, for the statements that PEG feeding tubes are contraindicated for patients with advanced dementia or on hospice or comfort-care, with 56.5% and 54.8% of respondents in disagreement with these items, respectively. In contrast, the majority of respondents agreed with the indication statement and that PEG feeding tubes are contraindicated if a competent patient decides that it is not in his or her best interest, with scores of 4.68 and 4.65, respectively. The respondents agreed (score > 3.8) that a multidisciplinary PEG team would be helpful to improve decision making and patient and caregiver satisfaction. There were no significant differences in responses between the 4 physician sub-groups, nor between resident and attending physicians, except that the neurology group had significantly ($p = 0.003$) higher agreement than did the general surgery group that a multidisciplinary PEG team would help to improve patient and caregiver satisfaction (Supplementary Appendix 2).

Table 2 Survey respondents

Physician types	1st year resident	2nd year resident	3rd year resident	4th year resident	Chief resident	Fellow	Attending	Research resident	5th year resident	Total
General surgery	5	4	7	1	3	1	10	1		32
Neurology	2	2	3	2			10			19
Neurosurgery		1			1		1		1	4
Other[a]	1	1				1	4			7
Total	8	8	10	3	4	2	25	1	1	62

[a]Other = thoracic, transplant, vascular, and pediatric surgery attending physicians; internal medicine 1st year resident, plastic surgery 2nd year resident, and vascular fellow

Table 3 Level of agreement with use of discussion topics in decision making

Please indicate your current practice regarding *discussions that you have* with patients and or family members / care partners, prior to making decisions to place PEG feeding tubes.	Level of agreement Mean ± SD (scale 1–5)
1. I ask if they have questions or concerns about PEG feeding. $n = 58$	4.57 ± 0.68
2. I ask if they have been instructed on the tube feeding regimen. $n = 57$	3.14 ± 1.06
3. I ask if they have been instructed on tube and site care. $n = 57$	3.07 ± 1.16
4. I discuss potential quality of life changes that may occur for patients. $n = 60$	3.95 ± 1.08
5. I discuss potential quality of life changes that may occur for the patient's family and/or caregivers. $n = 60$	3.52 ± 1.13
6. I inform that oral intake can still be possible for comfort in applicable situations (for those who can still swallow). $n = 60$	4.45 ± 0.81
7. I inform that tube feeding can be discontinued when desired by the patient and or family/care partners. $n = 59$	4.39 ± 0.87
8. I inform that the tube itself can be removed if desired, approximately one month after placement. $n = 60$	4.32 ± 1.17
9. I explain what may happen if PEG tube is not placed. $n = 60$	4.63 ± 0.69
Answer options	
Never (1)—almost never, (2)—sometimes, (3)—almost always, (4)—always, (5)—| Not applicable to my practice	
"n" varies because the answers "Not Applicable to my practice" were excluded from calculations For level of agreement data, scores range from 1 = Never to 5 = Always	

Figure 1 depicts the respondents' average agreement levels with indications and contraindications, calculated from their answers on the 5-point Likert scales. Figure 1 emphasizes the very low agreement with the statements that PEG feeding tubes are contraindicated in advanced dementia and at end of life. Figures 2 and 3 depict the variation of responses about advanced dementia, and hospice or comfort-care by illustrating the percentage of total respondents' who selected each of the 5 answer options.

For the two multi-select survey questions about responsibility for discussions with patients or care partners about the feeding tube's effect on prognosis, and on quality of life and ethical issues, "primary team" was chosen by 98% and 96.8%, while "endoscopist" as also chosen by 58% and 53%, respectively. For the general surgery responders alone, both options were checked by 65% and 53% for these statements, respectively.

The respondents' answers for the question about practice items are shown in Fig. 4, in which average levels of agreement were calculated from the response frequency on the 5-point Likert scales. Figure 4 emphasizes the low agreement with delaying decision for stroke patients by at least

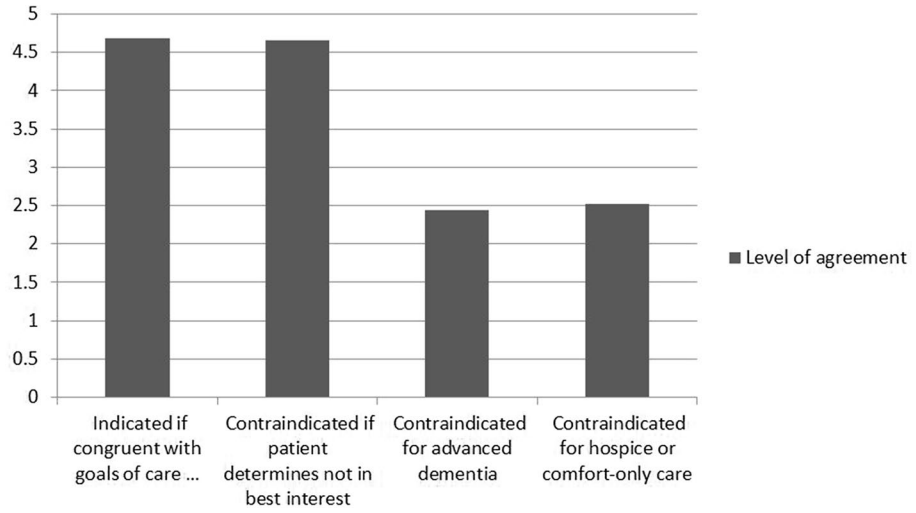

Fig. 1 Level of agreement with indications and contraindications for PEG feeding tubes

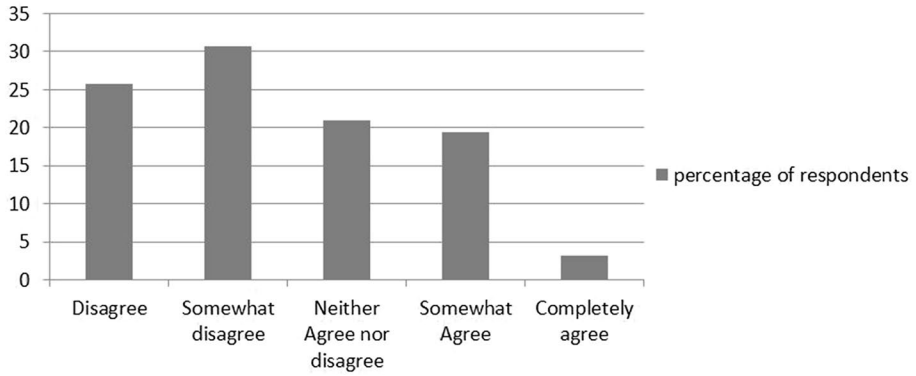

Fig. 2 Responses to survey statement: "PEG feeding tubes are contraindicated for patients with advanced dementia." ($n=62$)

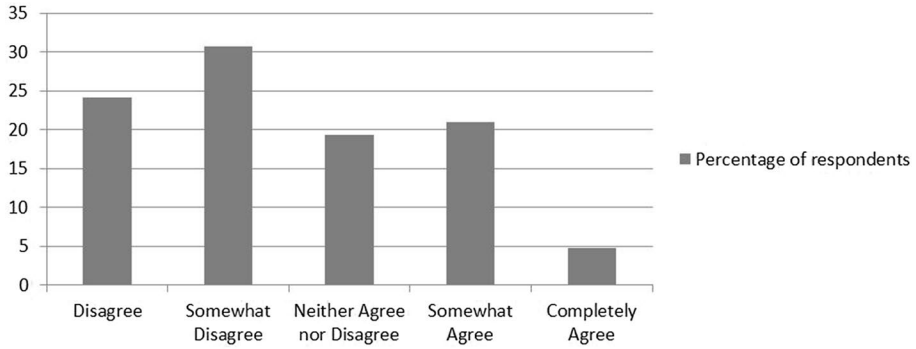

Fig. 3 Responses to survey statement: "PEG feeding tubes are contraindicated for patients on hospice or comfort-care only." ($n=62$)

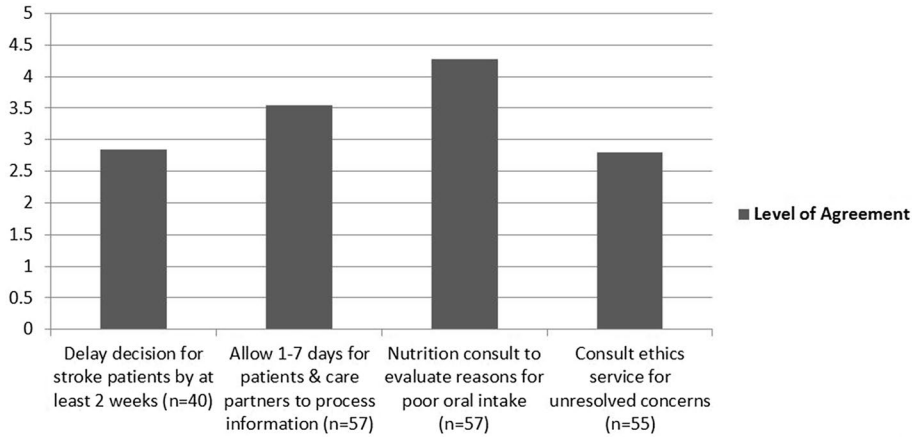

Fig. 4 Practices in decision making for PEG feeding tubes

2 weeks, and for consulting ethics service. For the statement about delaying the PEG decision for stroke patients, the agreement score was very low, at 2.85, and 35.5% of respondents felt this was not applicable to their practice. Figure 5 depicts the wide variation in survey responses for that item, emphasizing that "NA" was the most frequent answer given. The majority of respondents agreed with the practice of allowing a 1–7-day period for patients and or families/care partners to process information, with a score of 3.5. Agreement was very high, 4.28, for the practice of consulting nutrition to evaluate reasons for poor food intake, and much lower, at 2.8, for consulting ethics for unresolved concerns. There were no significant differences in responses between the 4 sub-groups, or between residents and attending physicians for the practice questions (Supplementary Appendix 3).

Discussion

The results of our study show that there is a need for improved awareness of the lack of usefulness of PEG feeding tubes for patients with advanced dementia, and for those at the end of life. Our findings are similar to other published studies [6–8]. Yet physician opinions vary among different specialties [9, 10] in different countries [26–31], and depending on how the questions are phrased [6–9, 26–31]. Whereas our study focused on opinions of surgeons, neurologists, and neurosurgeons, others investigated internal/general medicine [7–9], primary care [6, 7] and geriatric physicians [7–9, 29], and hospitalists [10], and only three included neurologists [6, 28, 31]. Previous survey studies used methods of mailing [6–9, 29], hand-delivery [26], or in-person interviews [28, 30], while we utilized online methodology as did one other study [27].

Our study showed physicians' disagreement with the contraindication of PEG feeding tubes in advanced dementia (56%) and at end of life (54%). Similarly, Callahan et al. [6] in 1999, reported that nearly 40% of 64 responders (81% primary care physicians and 6.5% neurologists), answered either likely or very likely to refer patients with dementia and severe functional impairment for placement of PEG tubes. Callahan's results differed from ours in that another > 40% of their respondents were unlikely or very unlikely to refer patients with advanced dementia for PEG tubes; and > 40% were unlikely, with only about 30% likely to refer patients for PEG in cases of terminal cancer with < 6 month prognosis [6]. In 2003, Shega et al. reported that 51% of a group of 195 primary care internal medicine and family practice physicians in the U.S. agreed that PEG tube placement is

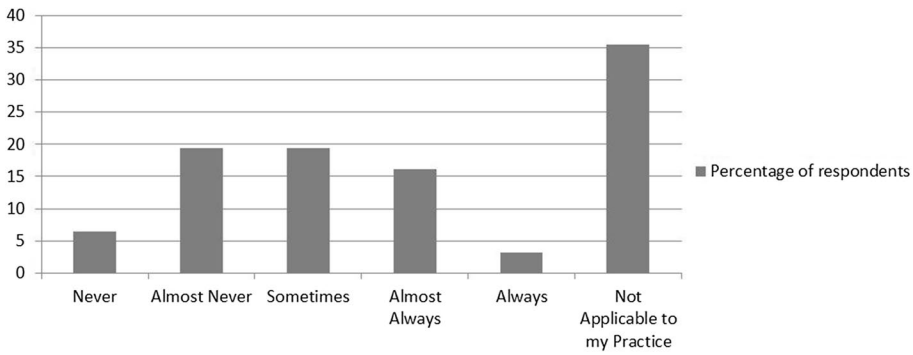

Fig. 5 Responses to survey statement: "For stroke patients, I delay decision for PEG feeding tube by at least 2 weeks, if possible..." ($n = 62$)

the standard of care for patients with advanced dementia, yet only 26% believed that it *should* be. Shega's results differed from ours such that in response to a hypothetical case of advanced dementia, 35% of the physicians agreed with placing a PEG tube and 65% did not [7].

Although our study did not address the reasons or barriers to avoiding the practice of PEG placement for patients with advanced dementia, some others have examined this [7, 8] and found that a majority of physicians felt that PEG tubes were beneficial to reduce recurrence of aspiration pneumonia [7, 8] and to improve nutritional status, healing of pressure ulcers, and survival [7] despite the lack of evidence in the literature for those benefits in that population [4, 5].

In a large survey of North Carolina Medical Society internal medicine, geriatric and family medicine physicians conducted in 2004 and 2005, only 18% indicated that they would recommend PEG placement for a hypothetical elderly patient with advanced dementia and weight loss; and significantly fewer internal medicine and geriatric, as compared to family medicine physicians, indicated that they would recommend PEG [9]. Teno et al. studied rates of PEG feeding tube insertion in hospitalized nursing home residents with advanced dementia who were admitted for dehydration or infection from 2001 to 2010. PEG insertion rates were much lower for the patients of hospitalists or non-hospitalist generalists, at 1.6% and 2.2%, respectively; as compared to 11% for all subspecialists and 15.6% for those with a mixture of physician types [10].

Survey results from other countries on the topic of tube feeding in advanced dementia or end-of-life care have similarities [26–29] and differences [30] with ours. In two hospitals in Israel, 339 specialist and resident physicians from medical, surgical, geriatric, oncology, intensive care, and family medicine wards, had average levels of agreement of 3.4, 4.15, and 4.52 on a scale of 5, for use of tube feeding for patients with metastatic cancer, severe irreversible mental impairment, and irreversible bedridden and incontinent condition, respectively [26]. For 288 physicians working in geriatric clinics, hospices, and rest homes in Italy, the average agreement with use of artificial nutrition for patients with advanced dementia was 42%, 77%, and 85% for life expectancies of <1 month, >1 to <6 months, and >6 months, respectively [27]. In Japan, the majority of a group of 30 physicians interviewed felt it standard of care to provide tube feedings to elderly patients with severe cognitive impairment [28], and 46.8% of a group of 555 board-certified geriatricians answered that dementia is an indication for tube feeding [29]. In contrast, Dutch and Australian general medicine, nursing home, and geriatric physicians reported reluctance to start artificial nutrition in patients with advanced dementia [30]. Interestingly, many physicians would not want tube feedings for themselves if in situations of end of life [26] or advanced dementia [28, 31].

Our study showed that many physicians disagreed with the idea of delaying the decision for PEG tube for at least 2 weeks for stroke patients. A literature review did not find any other physician survey studies that focused on delaying PEG placement for stroke patients; however, some studies are worth discussing in this context. George et al. reported that of 34,623 patients with acute ischemic stroke who received a PEG tube from the years 2001–2011 in the U.S., 53% had it placed within 1–7 days—with an average time to placement of 8.4 days from admission [15]. A retrospective review of a Florida inpatient database for the years 2006–2012, revealed that PEG tubes were placed on median hospital day 7 for ischemic, and day 9 or 10 for hemorrhagic stroke, and only 13–14% were consistent with the guideline to place PEG tubes at or after 14 days. Declining hospital length of stay may contribute to earlier PEG placements [16] as extended care and rehabilitation facilities specify PEG as a condition of acceptance (6) and we have speculated this similarly at our hospital.

The results of our survey show high agreement with the inclusion of certain key topics of discussion in decision making. Other published studies do not include survey questions specifically about discussion topics; however, they do include questions about the communication process as perceived by physicians, patients, and their caregivers and families, showing inadequate exchange of information [6, 19–22].

Our survey showed that physicians had high levels of agreement with the idea of a multidisciplinary PEG service to help with decision making, and a small number of studies on this subject reported positive results [23–25]. To the contrary, our work group felt that delegating decisions regarding PEG placement was not desirable, and that the primary service was in the best position to place these discussions into the proper clinical context. Yet because this must be complimented by scientific evidence, we felt that the best course of action was to develop standardized guidelines for use by all clinicians.

While there was high agreement among our respondents that the primary physician team has the main responsibility for discussions in the decision-making process around PEG placement, many respondents also felt that the endoscopist should contribute. In light of this, it is critical to have clarity of responsibility and communication, so that one service does not assume the other is taking responsibility, and vice versa. No other studies appear to have addressed this issue; however, it is worth further investigation, as there are cases in which an endoscopist is consulted for PEG placement, but disagrees that it is appropriate [32].

The results of this survey were shared with physicians, RDs, and SLPs at our hospital, and were the impetus to establish formal written guidelines on decision making for long-term feeding tube placement in our institution

and also as part of the education curriculum for our surgery endoscopy residents. Our findings of low agreement with consultation of ethics service prompted us to include guidelines to utilize this service in situations of disagreement among the healthcare team, patients, and caregivers.

For patients with advanced dementia or with terminal illness at end of life, tube feedings and PEG placement have not been proven beneficial and can worsen quality of life [5] as well as misuse limited healthcare resources, thus more emphasis should be placed on educating patients, families, and healthcare staff on alternatives that promote patient comfort, satisfaction, and dignity. Assisted oral feeding is a more cost-effective option for persons with advanced dementia, providing food in a way that can improve quality of life. Patients at end of life have a natural aversion to eating, and tube feeding and hydration can cause unnecessary complications, discomfort, and distress. Measurement of the potential benefits of providing or foregoing enteral feeding could better be assessed by patients' comfort and quality of life.

The main limitations of this study include the small sample size, the results are not generalizable as the survey took place in a single hospital, and 56.5% of the respondents were residents. In teaching hospitals, residents are involved in discussions regarding PEG placement, thus our findings may not be generalizable to non-teaching hospitals. The overall low survey response rate of 26.8% does not allow strong conclusions, particularly for the neurosurgery subgroup, which had only a 10% return. While these low return rates may not allow generalization, the completed surveys do demonstrate a knowledge gap and disagreement around the issues of PEG placement in patients with advanced dementia as well as in end-of-life care. Reasons for our low response rate include the e-mail method of delivering the survey; the survey was not repeated multiple times to recruit initial non-responders; and that the survey did not originate from physician colleagues, but rather from an RD.

It is important to mention that this survey, if distributed to general medicine, hospitalist, palliative care, and gastroenterology specialists at the same or other hospital systems, could result in different responses. Several of our gastroenterologists, palliative care, and hospitalist physicians, although not surveyed, expressed full agreement with the contraindication of PEG feeding for patients at end of life and for those with advanced dementia, and also advocated use of the Alzheimer Association guidelines [33].

The word "contraindicated" used in three of the survey questions in this study may be perceived as an excessively strong term, and perhaps "generally contraindicated" or "generally not efficacious" may have resulted in higher levels of agreement. The primary investigator believed that use of the more definitive term would improve the accuracy of the results, as survey respondents ranked the statements on the 5-point scales to define their own levels of agreement.

One survey respondent shared the following comments:

> "Regarding the section about indications for a PEG tube: I think that an indication / contraindication to PEG placement is a separate issue from consent to get a PEG. A patient may have an indication for PEG but the patient or family disagrees or doesn't give consent. In that case the PEG won't happen but that doesn't change the fact that there is an indication for PEG placement. The two are important but somewhat unrelated. I only mention this because several of the indication questions seem to conflate these issues making it a little difficult to actually answer the question. At least to me. I just wasn't sure how to respond to those questions and wanted to share why. I thought it might help with interpretation of the data later on."

In conclusion, this study showed a strong agreement among physicians for discussing important topics with patients and their families or care partners, for allowing sufficient time for information processing, and to include endoscopists in the shared decision process with patients and families considering PEG tube placement. This survey showed a strong lack of agreement around the established recommendations that PEG placement is not advisable in patients with advanced dementia or in end of life/comfort-care, and with the guideline to delay PEG placement for at least 2 weeks in the setting of dysphagia due to a stroke. Our study results are consistent with others that these knowledge gaps are widely prevalent among other physicians and health care professionals as well; demonstrating the need to correct these deficits with standardized guidelines and educational initiatives. We used this information to develop a set of clinical practice guidelines for decision making for PEG tube placements in our health system.

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Compliance with ethical standards

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References

1. Moran C, Mahoney S (2015) When is feeding via a percutaneous endoscopic gastrostomy indicated? Curr Opin Gastroenterol 31:137–142
2. Westaby D, Young A, O'Toole P, Smith G, Sanders DS (2010) The provision of a percutaneously placed enteral tube feeding service. Gut 59:1592–1605

3. Kenny N, Singh SA (2015) Decision making for enteral nutrition in adult patients with dysphagia—a guide for health care professionals. In: Seminars in dysphagia. Chap 8. https://doi.org/10.5772/60987
4. American geriatrics society ethics committee and clinical practice and models of care committee (2014) American geriatrics society feeding tubes in advanced dementia position statement. J Am Geriatr Soc 62:1590–1593
5. Baird Schwarz D, Barrocas A, Wesley JR, Kliger G, Pontes-Arruda A, Arenas Marquez H, Lembo James R, Monturo C, Lysen LK, DiTucci A (2014) Gastrostomy tube placement in patients with advanced dementia or near end of life. Nutr Clin Pract 29:829–840
6. Callahan CM, Haag KM, Buchanan NN, Nisi R (1999) Decision-Making for Percutaneous Endoscopic Gastrostomy among older adults in a community setting. J Am Geriatr Soc 47:1105–1109
7. Shega JW, Hougham GW, Stocking CB, Cox-Hayley D, Sachs GA (2003) Barriers to limiting the practice of feeding tube placement in advanced dementia. J Palliat Med 6:885–893
8. Vitale CA, Hiner T, Ury WA, Berkman CS, Ahronheim JC (2006) Tube feeding in advanced dementia. An exploratory survey of physician knowledge. Case Manag J 7:79–85
9. Modi SC, Whetsone LM, Cummings DM (2007) Influence of patient and physician characteristics on percutaneous endoscopic gastrostomy tube decision-making. J Palliat Med 10:359–366
10. Teno J, Meltzer DO, Mitchell SL, Fulton AT, Gozalo P, Mor V (2014) Type of attending physician influenced feeding tube insertions for hospitalized elderly people with severe dementia. Health Aff 33:675–682
11. Jauch EC, Saver JL. Adams HP Jr, Bruno A, Connors JJ, Demaerschalk BM, Khatri P, McMullan PW, Qureshi AI, Rosenfield K, Scott PA, Summers DR, Wang DZ, Wintermark M, Yonas H (2013) Guidelines for the early management of patients with acute ischemic stroke: a guideline for healthcare professionals from the American Heart Association / American Stroke Association. Stroke 44:870–947
12. Wirth R, Smoliner C, Jäger M, Warneck T, Leischker AH, Dziewas R, the DGEM Steering Committee (2013) Guideline clinical nutrition in patients with stroke. Exp Transl Stroke Med 5: 1–11. https://doi.org/10.1186/2040-7378-5-14
13. The FOOD Trial Collaboration (2005) Effect of timing and method of enteral tube feeding for dysphagic stroke patients (FOOD): a multicenter randomized controlled trial. Lancet 365:764–772
14. Powers WJ, Rabinstein AA, Ackerson T, Adeoye OM, Bambakidis NC, Becker K, Biller J, Brown M, Demaerschalk BM, Hoh B, Jauch EC, Kidwell CS, Leslie-Mazwi TM, Ovbiagele B, Scott PA, Sheth KN, Southerland AM, Summers DV, Tirschwell DL (2018) 2018 Guidelines for the early management of patients with acute ischemic stroke. A guideline for healthcare professionals from the American Heart Association / American Stroke Association. Stroke. https://doi.org/10.1161/STR.0000000000000158
15. George BP, Kelly AG, Albert GP, Hwang DY, Holloway RG (2017) Timing of percutaneous endoscopic gastrostomy for acute ischemic stroke. An observational study from the U.S. nationwide inpatient sample. Stroke 48:420–427
16. Wilmskoetter J, Simpson AN, Simpson KN, Bonilha HS (2016) Practice patterns of percutaneous endoscopic gastrostomy tube placement in acute stroke: are the guidelines achievable? J Stroke Cerebrovasc Dis 25:2694–2700
17. Royal College of Physicians and British Society of Gastroenterology (2010) Oral feeding difficulties and dilemmas: a guide to practical care, particularly towards the end of life. Royal College of Physicians, London. http://bit.ly/1H4DZcc, https://www.rcplondon.ac.uk/projects/outputs/oral-feeding-difficulties-and-dilemmas/. Accessed 8 Aug 2018
18. Kon AA, Davidson JE, Morrison W, Danis M, White DB (2016) Shared Decision Making in ICUs: An American College of Critical Care Medicine and American Thoracic Society Policy Statement. Crit Care Med 44:188–201
19. Van Rosendaal GMA, Verhoef MJ, Kinsella TD (1999) How are decisions made about the use of percutaneous endoscopic gastrostomy for long term nutritional support? Am J Gastroenterol 94:3225–3228
20. Brotherton A, Abbott J (2009) Clinical decision making and the provision of information in PEG feeding: an exploration of patients and their carers' perceptions. J Hum Nutr Diet 22:302–309
21. Teno JM, Mitchell SL, Kuo SK, Gozalo PL, Rhodes RL, Lima JC, Mor V (2011) Decision-making and outcomes of feeding tube insertion: a five state study. J Am Geriatr Soc 59:881–886
22. Hanson LC, Garrett JM, Lewis C, Phifer N, Jackman A, Carey TS (2008) Physicians' expectations of benefit from tube feeding. J Palliat Med 11:1130–1134
23. Holt DQ, McDonald JF, Murray ML, Hair C, Devonshire A, Strauss BJ, Moore JT (2015) Clinical selection criteria can predict futile intervention in patients referred for percutaneous endoscopic gastrostomy insertion. Internal Med J 45:648–652
24. Skitt LC, Hurley JJ, Turner JK, Green AJ, Pinch N, Dolwani S, Swift GL, Green JT (2011) Helping the general physician to improve outcomes after PEG insertion: how we changed our practice. Clin Med 11:132–137
25. Campbell ML, Dove-Meadows E, Walch J, Sanna-Gouin K, Colomba S (2011) The impact of a multidisciplinary educational intervention to reduce PEG tube placement in patients with terminal-stage dementia: a translation of research into practice. J Palliat Med 14:1017–1021
26. Carmel S (1999) Life sustaining treatments: what doctors do, what they want for themselves and what elderly persons want. Soc Sci Med 49:1401–1408
27. Pengo V, Zurlo A, Voci A, Valentini E, De Zaiacomo F, Catarini M, Iasevoli M, Maggi S, Pegoraro R, Manzato E, Giantin V (2017) Advanced dementia: opinions of physicians and nurses about antibiotic therapy, artificial hydration and nutrition in patients with different life expectancies. Geriatr Gerontol Int 17:487–493
28. Aita K, Takahashi M, Miyata H, Kai I, Finucane T (2007) Physicians' attitudes about artificial feeding in older patients with severe cognitive impairment in Japan: a qualitative study. BMC Geriatrics. https://doi.org/10.1186/1471-2318-7-22
29. Ogita M, Utsunomiya H, Akishita M, Arai H (2012) Indications and practice for tube feeding in Japanese geriatricians: implications of multidisciplinary team approach. Geriatr Gerontol 12:643–651
30. Buiting HM, Clayton JM, Butow PN, van Delden JJM, van der Heide A (2011) Artificial nutrition and hydration for patients with advanced dementia: perspectives from medical practitioners in the Netherlands and Australia. Palliat Med 25:83–91
31. Komiya K, Ishii H, Teramoto S, Yasuda T, Sato S, Yamamoto H, Kimura H, Takahashi O, Hiramatsu K, Kadota J (2012) Medical professionals' attitudes toward tube feeding for themselves or their families: a multicenter survey in Japan. J Palliat Med 15:561–566
32. Scott LD (2005) The PEG "Consult" Ethics in Gastroenterology. Am J Gastroenterol 100:740–743
33. Alzheimer's Association Board of Directors (2011) Alzheimer's Association Assisted oral feeding and tube feeding. http://mythoughtsondementia.com/Pamplets/Assisted_Oral_Tube_Feeding.pdf. Accessed 8 Aug 2018