Pilot Study of Feeding Tube Education Using a Graphic-Based Course

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ABSTRACT

Background: Residents receive little formal education about feeding tubes; however, patients experience fewer complications if a formal feeding tube curriculum is implemented.

Objective: The aim of this study was to evaluate a graphics-based course for internal medicine residents.

Methods: Internal medicine residents participated in a new course on feeding tube placement and management. Surveys administered before and after the course assessed resident comfort level with the material.

Results: Based on a 10-point Likert scale, mean improvement in comfort level for 4 scenarios was 1.69, 2.13, 2.44, and 3.07 points ($P<0.001$ for all). Ninety-four percent of participants reported the graphics were helpful.

Conclusion: The new course significantly improved resident comfort level regarding feeding tube placement and management. The use of graphics played a role in increasing residents' understanding.

INTRODUCTION

Feeding tubes—consisting of nasogastric (NG) tubes, nasojejunal (NJ) tubes, and percutaneous endoscopic gastrostomy (PEG) tubes, are present in over 3% of hospitalized patients.[1] There have been reports of mishandling of feeding tubes by residents and medical students, leading to adverse outcomes or even untimely patient deaths, as well as multiple incidents reported to the National Patient Safety Agency.[2,3] These poor outcomes are likely tied to limited physician education, as data show that patients who rely on feeding tubes at home have fewer complications if their primary caregiver received education about tube complications.[4]

One might assume that every resident receives formal education regarding feeding tubes; however, reports show that only 76.1% of programs provide training on this topic, and confidence in feeding tube management among residents is only 50%.[5] This topic may be overlooked in graduate medical education because maintenance and basic troubleshooting of feeding tube complications are often handled by nursing staff and because radiographic confirmation of correct placement can be deferred to a radiologist. Not only is the topic of feeding tube placement and management missing from the curriculum of many residency programs, but there are no studies on the most effective ways to teach this topic.

One promising approach for feeding tube education might be the use of comics or graphics, which have been shown to be effective in teaching medical trainees about patient safety and hepatitis B.[6,7] In fact, educational tools with cartoons have been shown to be noninferior to traditional-style tools, and they had higher completion rates.[8]

Our hypothesis is that a formal teaching curriculum regarding feeding tubes and their complications will increase resident physician knowledge and comfort level, leading to improvements in patient care. As such, we created a pilot study for such a curriculum that incorporates the use of medical graphics.

METHODS

Setting and Participants

In 2019, internal medicine residents from the Medical College of

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Wisconsin—designated as post graduate year (PGY) 1 through 4 depending on the number of years since graduating from medical school—participated in a pilot study for a new curriculum and assessment. Course participation was optional.

Institutional review board approval was granted by the Department of Veterans Affairs, Milwaukee VA Medical Center. Written informed consent was waived in lieu of an informational letter.

Interventions

Educational lectures were presented to participants in a scenario-based format that included medical graphics (See Figure 1). Participants had no prior formal training on the topic. Scenarios included how to confirm placement of a NG or NJ feeding tube radiographically, how to troubleshoot common complications of PEG tubes, and what to do if a PEG tube is unintentionally removed.

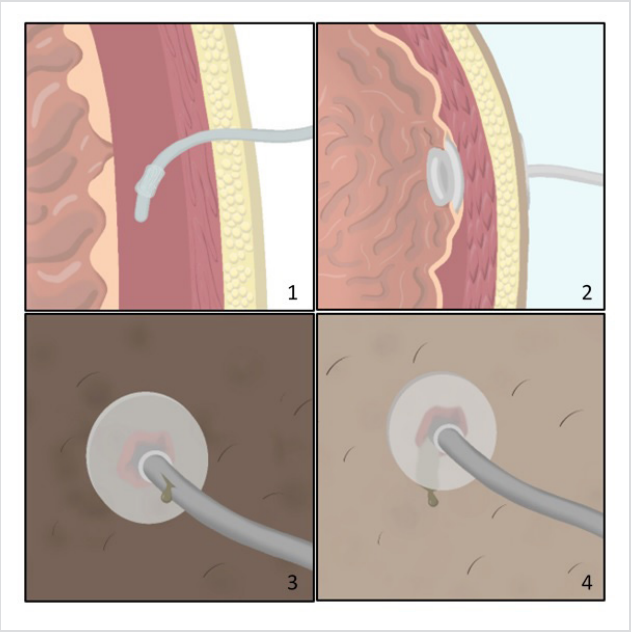
A 1-hour session for PGY1 residents and a separate 1-hour session for PGY2 residents and up were incorporated into existing protected academic time and taught by one of the senior residents. Educational content was approved by a staff gastroenterologist beforehand.

Outcomes Measured

Participants were asked to complete pre- and post-intervention surveys identifying their comfort level in 4 areas using a 10-point Likert scale (1 = very uncomfortable and 10 = very comfortable). The areas were (1) confirming placement of a NG feeding tube, (2) confirming placement of a NJ feeding tube, (3) knowing which medications can and cannot be administered through feeding tubes, and (4) troubleshooting complications that arise with PEG tubes. The post-intervention survey also asked whether participants thought the use of graphics enhanced their learning, based on a 4-point Likert scale from "not helpful at all" to "very helpful."

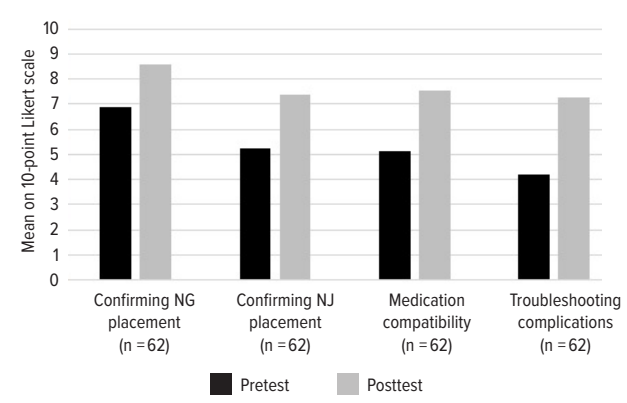
Data was analyzed using a 2-tailed paired Student *t* test and a Cohen's d_s test.

Figure 1. Medical Graphics Used During Educational Intervention, Representing (1) Replacement Peritonitis, (2) Buried Bumper Syndrome, (3) PEG Tube Leakage, and (4) PEG Tube Seepage



Abbreviation: PEG, percutaneous endoscopic gastrostomy.

Figure 2. Mean Scores From Resident Self-Assessments Regarding Their Comfort Level in 4 Areas of Content From Feeding Tube Curriculum



Abbreviations: NG, nasogastric; NJ, nasojejunal.

RESULTS

Sixty-two out of 122 residents (50.8%) participated in the study. This is consistent with the typical attendance at the residency program's weekly academic half day—the teaching venue—given that many residents on any given day are on call, postcall, or have a scheduled day off. Every resident who was in attendance that week volunteered to participate. There were 23 PGY-1 residents, 18 PGY-2 residents, 20 PGY-3 residents, and 1 PGY-4 resident.

Scenario #1—confirming placement of a NG feeding tube—had a mean preintervention rating of 6.89 and a mean postintervention rating of 8.58 (Cohen's $d_s = 0.92$) ($P < 0.001$). Scenario #2—confirming placement of a NJ feeding tube—had a mean preintervention rating of 5.23 and a mean postintervention rating of 7.35 (Cohen's $d_s = 1.01$) ($P < 0.001$). Scenario #3—understanding which medications should and should not be administered through feeding tubes—had a mean pre-intervention rating of 5.1 and a mean postintervention rating of 7.53 (Cohen's $d_s = 1.10$) ($P < 0.001$). Scenario #4—troubleshooting complications that arise with PEG tubes—had a mean preintervention rating of 4.19 and a mean postintervention rating of 7.25 (Cohen's $d_s = 1.45$) ($P < 0.001$). These data are shown in Figure 2.

Additionally, 58 out of 62 (94%) residents stated that including medical graphics illustrating possible complications was either helpful or very helpful for enhancing their learning.

DISCUSSION

Our pilot study created a large and significant improvement in resident physician comfort level with 4 areas of medical knowledge regarding feeding tube placement and management. A large majority of the residents felt that their understanding was enhanced by the inclusion of graphics.

These findings are promising for improvement in resident understanding of feeding tube complication management. They also provide more support for the inclusion of graphics in medical education to increase participation and enhance understanding. While a limited intervention such as this has low likelihood of showing a change in hospital-reported outcomes given the many confounding factors, it is possible that there have been downstream benefits wherein patients might have fewer adverse events from complications. These could be better elucidated through a longitudinal follow-up of our curriculum, by testing participants for retention and complete understanding of the content the year after they learned the material. Other future directions could include using a control group without medical graphics to better determine the role those graphics play in education. The residents in this study subjectively reported that the graphics enhanced their learning, however, it is possible that text-only or verbal-only instruction may have been sufficient in the setting of limited training prior to this intervention.

A potential limitation to the external validity of this study is the fact that the curriculum has been administered only to internal medicine residents in 1 residency program. Implementation of such a curriculum in the future may benefit not only internal medicine residents but also residents in other specialties, such as surgery or pediatrics, as not all programs have formal training on this topic. Further study will be needed to determine whether benefit is added across multiple types of residency programs and whether medical graphics may be a superior way to provide this education.

CONCLUSIONS

This pilot study demonstrated that a case-based curriculum with medical graphics significantly improved resident physician comfort level with 4 areas regarding feeding tube placement and management.

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