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An Examination of Nurses' Understanding and Experience with Enteral Tube Drug Delivery

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ABSTRACT

Background: Enteral tubes are critical for delivering artificial nutrition, hydration (ANH), and medications to patients. However, practical challenges such as tube blockages, improper medication administration practices, and insufficient training can compromise patient care and increase healthcare costs. Research has highlighted the need for improved education, equipment, and institutional support to enhance medication delivery through enteral tubes.

Methods: This descriptive, exploratory study utilized a self-reported survey distributed to 150 registered nurses in medical, surgical, and intensive care wards. The survey included 28 items covering knowledge, practices, challenges, and training regarding medication administration via enteral feeding tubes. Data were analyzed using Microsoft Excel™, and thematic analysis was conducted to identify patterns and challenges.

Results: A total of 73 nurses (48.7% response rate) participated, with 64% reporting over five years of experience in administering medications via enteral tubes. Nearly half (45%) had not received training in medication administration for enteral feeding, while 44% of training occurred over five years ago. Most nurses (96%) recognized the importance of flushing feeding tubes, yet only 77% consistently practiced this. Challenges included tube blockages (52% required replacement), limited access to liquid formulations, and insufficient equipment such as connectors and clamps. Nurses also highlighted the time-consuming nature of medication preparation, particularly with proton-pump inhibitors and lactulose. Suggested improvements included enhanced training, better equipment, simplified guidelines, and coordinated medication sourcing.

Conclusion: The study identified significant gaps in training, resources, and support for nurses administering medications via enteral tubes. Addressing these challenges through multidisciplinary training programs, improved equipment availability, and streamlined guidelines is essential for ensuring safe and efficient care. Enhanced collaboration between nursing, pharmacy, and prescribing teams can further optimize practices and reduce complications associated with enteral tube medication administration.

Keywords: collaboration, nursing, pharmacy, challenges, training.

INTRODUCTION

Enteral nutrition is delivered through various types of tubes, including nasogastric tubes (NGT), percutaneous endoscopic gastrostomy (PEG) tubes, radiologically inserted gastrostomies (RIG), jejunostomies, and jejunostomy extensions. Each type of tube presents unique practical challenges that can affect the continuity of artificial nutrition, hydration (ANH), and medication delivery.Practical issues such as accidental tube dislodgement and frequent blockages are common and can result in emergency medical visits, particularly for patients entirely dependent on their enteral tube for ANH (BAPEN, 2019).

Mechanical problems like blockages often arise due to thickeners in feeds or certain medications, including

granules from oral suspensions and thicker syrups. Blockages are more frequent with NGTs than with PEG tubes, given the smaller diameter of NGTs (BAPEN, 2017). The likelihood of blockages increases when more than five medications are administered via the tube over a period of 10 or more days (Heineck et al., 2009). Other complications include accidental tube removal, tube splitting with leakage, and irritation or ulceration of the surrounding mucosa (Blumenstein et al., 2014).

Medications are a significant contributor to enteral tube blockages, which can sometimes necessitate hospital admission, leading to increased healthcare costs (Callahan et al., 2001). In one study, 7% of patients experienced complete tube failure due to blockage (Blacka et al., 2004).

Research has shown variation in practices and unsafe methods in medication administration through enteral tubes. For example, a study of intensive care nurses identified issues such as crushing tablets without considering their compatibility with the tubes and inadequate in-service training (Belknap et al., 1997). Another study involving familial caregivers found that 13% faced difficulties administering medications through enteral tubes, with less than two-thirds receiving advice from healthcare professionals and only 8% provided with written guidance (Alsaeed et al., 2018).

Challenges included managing multiple medications simultaneously, using formulations unsuitable for enteral tube delivery, and modifying medications from their original form. These modifications may impact medication efficacy or cause interactions with other medications or the tube material (Alsaeed et al., 2018). To address these issues, there is a need for greater support for caregivers, the availability of appropriate formulations, and advancements in enteral tube technology to improve usability (Phillips & Endacott, 2011).

This study aims to explore nurses' experiences with medication administration through enteral tubes in hospital settings, identify the challenges they face, and understand their needs and expectations to improve the process of medication administration via enteral tubes.

Methods and Design

The study employed a descriptive, exploratory design using a self-reported, paper-based survey. Practice development in this context refers to an audit-based approach aimed at improving existing processes or enhancing knowledge about them rather than exploring new concepts. The survey was designed after an extensive review of current literature to incorporate all relevant aspects identified in previous studies, ensuring the findings could be compared with earlier research.

The survey included 28 items and was distributed along with a participant information sheet in paper format. Distribution was conducted internally via an established mailing system. A total of 150 voluntary questionnaires were provided to registered nurses working across intensive care units, cardiac wards, and surgical and medical wards.

RESULTS

A total of 73 nurses completed the survey, yielding a 48.7% response rate. Participants were employed across 10 nursing specialties, with 53 from medical wards, 7 from critical care units, and 13 from surgical wards.

Regarding experience with administering medications via enteral tubes, most respondents were highly experienced. Sixty-four percent had over five years of experience in this practice, while only 7% had less than one year. Additionally, 63% of nurses performed this task at least weekly, while 37% reported doing so less frequently, on a monthly or occasional basis.

Nearly half (45%) of the respondents stated they had not received any training on administering and preparing medications for enteral feeding tubes. Among those who had undergone training, 44% received it more than five years ago, while 20% had been trained within the past year. The most common training format, reported by 63%, was verbal advice or explanations, followed by face-to-face sessions (23%) and simulation or supervised practice (9%). Some respondents (29%) had experienced multiple methods of training.

Respondents identified 11 potential resources that could provide guidance on administering medications via feeding tubes. The most frequently mentioned were institutional guidelines (27%), advice from pharmacists (22%), and the British National Formulary (17%).

Most participants (96%) were aware of the importance of flushing feeding tubes to prevent interactions between drugs or with nutrition. However, only 77% reported consistently flushing the tube after administering each medication. When asked about the volumes used for flushing, responses varied widely, ranging from 7.5–100 ml per medication and 15–150 ml after all medications, with 50 ml and 100 ml being the most common choices. Sixteen percent of nurses consulted a dietitian for advice on flushing volumes.

Regarding the practice of stopping feeding during medication administration, 33% believed it unnecessary to stop the feed. Of the remainder, 71% stopped the feed only when medication was due, while 25% paused feeding for no longer than the time required for administration. A small proportion (4%) administered medication only during scheduled feeding breaks. The duration of feed cessation varied from 1–60 minutes, depending on the specific requirements of the medication.

A large majority (79%) of respondents reported modifying medications for administration via enteral tubes, with

69% doing so at least weekly and 11% daily. Fifty-four percent converted solid forms such as tablets or capsules into liquid, while 10% received liquid formulations from the pharmacy. Sixteen percent had to request liquid formulations, and 10% opted to change the administration route.

When checking information about modifying medications, 62% of respondents did so only when encountering unfamiliar drugs, 16% relied on electronic alerts from prescribing systems, 12% reviewed the guidelines every time, and 10% never consulted any resources. Pharmacists, doctors, or colleagues were the primary sources of advice on drug modifications, with only 12% using reference books.

Sixty percent of participants had experienced enteral tube blockages that required significant flushing to resolve. Over half (52%) had dealt with blockages severe enough to necessitate tube replacement, while 23% reported having to replace tubes due to hardening or staining caused by medication. When asked about the workload impact of administering medications through feeding tubes, 66% said there was no significant effect. However, those who noted an increased workload attributed it to the need for careful preparation, specific drug properties, and complex administration processes.

When comparing medication administration routes, 59% of participants found feeding tube administration more time-consuming than oral or intravenous routes, 19% reported no significant difference, and 22% considered other routes slower. Proton-pump inhibitors were identified as the most challenging drugs to administer, followed by lactulose.

Nurses shared various strategies to ease medication administration through feeding tubes, including preparation, equipment use, sequencing medications, techniques for dilution, and extra water use. Among those who commented, 24% highlighted the importance of dilution.

If a required medication was not available in the correct formulation, half of the respondents reported obtaining it within 24 hours, while the other half experienced longer delays. Opinions on the ease of sourcing medications were evenly split, with responses leaning slightly towards ease of access.

Participants employed several methods to prevent or resolve tube blockages, including preparation, proper equipment, flushing techniques, aftercare practices, and seeking professional assistance.

DISCUSSION

The findings of this study revealed considerable variability in nursing practices related to medication administration. A notable percentage of nurses reported regular use of enteral tubes, with most receiving only outdated verbal training. Practices around tube flushing, medication alteration, administration timing, feed continuation, and resource usage were inconsistent.

Variations in medication administration practices persist, extending beyond critical care environments into general wards, as evidenced by this UK-based study. Inconsistent or potentially incorrect practices may contribute to complications such as tube blockages—an issue familiar to many nurses—and overhydration in some patients. Training appeared limited and often relied solely on verbal guidance, which was frequently outdated.

Altering medications, such as crushing tablets, can lead to unintended consequences. For instance, the American Society for Microbiology conducted a pharmacokinetic study comparing crushed versus whole Voriconazole tablets, revealing that crushed tablets resulted in faster peak plasma concentration and quicker clearance, though overall systemic exposure was not significantly different (Dodds Ashley et al., 2007). Similarly, Pouplin et al. (2014) examined the impact of tablet splitting and found variations in actual drug content compared to expected proportions, indicating potential inaccuracies in dosage. Other studies highlight that altering solid dosage forms can reduce medication efficacy and reliability (Belknap et al., 1997; Sari et al., 2018; Uysal et al., 2016).

Smith (1997) noted that adding medications to enteral feeds may compromise feed quality, stability, and bioavailability of the drugs. Furthermore, administering drugs through enteral tubes often involves off-label use, transferring legal liability to healthcare providers in the event of adverse outcomes. This underscores the importance of proper equipment, accurate knowledge of drug modification, and attention to potential medication-feed interactions to ensure effective medication delivery.

CONCLUSIONS

Key areas for improvement include the implementation of multidisciplinary training programs to ensure cohesive patient care. Such training should emphasize medication review before enteral tube placement to ensure the use of the most appropriate formulations. Additionally, enhancing access to proper equipment, medication-crushing devices, and concise reference materials could support busy healthcare environments and foster better practices.

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