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Current Practices in Home Management of Nasogastric Tube Placement in Pediatric Patients: A Survey of Parents and Homecare Providers

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ABSTRACT

Enteral feeding tubes are used in pediatric patients to deliver nutrition, fluids or medications. The literature related to short-term feeding tube (nasogastric [NG], hereafter known as NGT, or orogastric [OGT],) use in pediatric homecare patients is sparse. This descriptive study sought to gather baseline information about these children and how their feeding tubes are managed at home. Specifically, we sought to better understand how the tubes are placed and the method(s) used for tube placement verification. Two surveys were distributed: one to parents and one to homecare providers who have direct patient contact.

Results: Responses were obtained from 144 parents and 66 homecare providers. Over half of the children were 12 months of age or younger and had a 6 Fr feeding tube. Over 75% (108) had an NGT for 1 year or less. Predominantly parents replaced the NGT but a few children self-inserted their tubes. Feeding tube placement was verified by auscultation (44%) or measurement of gastric pH (25%) in the parent's survey. Twenty-six percent of parents indicated they had misplaced an NGT at least once and 35 parents described symptoms of pulmonary misplacement. The homecare provider data indicated auscultation (39%) and pH measurement of gastric contents (28%) to verify NG tube placement location.

Study results confirms a need for consistency of practice among health care professionals and in parent education for those children who require NGTs at home. It is troubling that auscultation is still widely used for NGT location confirmation despite practice alerts that warn against its use.

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Background and Purpose

The incidence of inadvertent placement of an enteral tube into the lung of neonatal and pediatric patients is difficult to discern due to lack of required or standard reporting mechanisms. Additionally, one concern of institutions might be that of litigation or loss of reputation within the pediatric community, which may be one of the factors for the reluctance of reporting an adverse event involving an NGT by an institution. The language used to describe nasogastric tube (NGT) misplacement or dislodgement varies between institutions and providers, creating difficulty in quantifying the occurrence of these events. However, retrospective studies in hospitalized children have demonstrated the

incidence of NG tube misplacement is estimated to be 21–43% (Ellett, Croffie, Cohen, & Perkins, 2005; Quandt, Schraner, Bucher, & Mieth, 2009). It is unknown what the rate of misplacement of NGTs are in homecare as there are very few studies in the literature related to management of home NGT use and none regarding NGT misplacement.

Little is known about the use of enteral tubes in the homecare setting (Evan et al., 2010; Rosen et al., 2016; Sorokin & Gottlieb, 2006; Pedron-Gilner et al., 2012). Of these studies, only one addressed complications (Rosen et al., 2016). Evan et al. (2010) addressed use of home enteral feedings as a viable resource for children and studied the safety aspects of caregiver's enteral feeding tube placement technique in children with inherited metabolic disorders who required home enteral tube feeding. According to the authors, a questionnaire and practical assessment of the feeding process was completed by care givers, a dietician and a nurse in the child's home. The feeding mode was evenly divided between gastrostomy and NGT. The main issues identified were poor compliance with sanitation issues, and a lack of appropriate implementation of the feeding regimen (Evan et al. (2010)). The

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researchers recommended regular updates on knowledge and technique to reduce risk of NGT misplacement in this population. There was no mention of enteral tube placement issues such as replacement or misplacement in the home.

Pedron-Gilner et al. (2012), reported a 10 year experience of 304 children requiring home enteral nutrition including 218 with NGTs. The major diagnoses were oncological disease (29.9%) and digestive diseases (27.6%). The authors noted that significant differences were related to age of the child at the onset of the home enteral feeding regimen, feeding infusion schedules and the formula prescribed. The researchers concluded that in their cohort enteral nutrition support with use of an NGT generally started at an early age, and varied depending on the disease of the child and medical treatment. Additionally, they found knowledge of the patient profile was important in designing the most effective strategy for home enteral feedings. There was no mention of complications or adverse effects related to enteral tube feedings.

In 2005, Daveluy, et al. published a study of an 11 year experience of 416 children with home enteral nutrition (Daveluy et al., 2005). Fifty three percent of the children were fed by nasogastric tube, with 41% by gastrostomy tube. An enteral feeding pump was used in 98% of the patients. The study concluded that home enteral nutrition can be used to treat children with chronic diseases, can be started early in life, and can be prolonged over several years. Complications or adverse events related to enteral tube use were not addressed.

In a recent retrospective chart review, Rosen et al. (2016) assessed post hospitalization feeding status and the impact on growth in children with chronic diseases discharged to home with NGT feedings. A total of 87 patients were included ranging in age from 3 months to 16 years of age with a variety of medical conditions. In the study 33% of the patients were discharged on continuous feedings and 44% were on a combination of bolus and continuous feedings. One hundred percent of the parents received NGT education prior to discharge and 94% had a homecare nurse. In 13% of the patients, parents discontinued feedings because of vomiting, inability to keep the tube in place, or because they felt the child was unable to tolerate the feeding tube. On average it took 4.8 months for children to successfully complete the prescribed treatment and progress to full oral feedings. This study suggests home enteral feedings requiring an NGT can be a prolonged arduous process for families to undertake (Rosen et al., 2016).

The lack of published research related to NGT placement and verification in the inpatient setting and recognizing that many children are discharged with NGTs for enteral feedings prompted the question to investigate what occurs in the homecare setting. The number of children at home using NGTs is unknown, as it is often a temporary measure for those children who are unable to take all feeding, hydration and medication orally. Decision making for a temporary NGT versus a percutaneous or surgically placed gastrostomy tube is multidisciplinary and multidimensional and beyond the scope of this paper. Given the complexity of the phenomena, the gap in the literature related to NGT misplacement, potential for complications, methods used for NGT location verification in the home, and the unknown as to how many children these issues affect, the current study was undertaken. The overarching purpose of this study was to collect data in the pediatric population to better describe the state of use, placement and management of displacement of nasogastric feeding tubes in pediatric homecare patients. The primary aim of the study is to address the data gap that exists related to placement, misplacement/complications of NGTs and to describe methods for placement and verification in the home when X-ray is not an option. In addition, this study may introduce questions to guide further research on NGT placement verification methods and help establish best practices for homecare settings. As a result of these findings there may be impetus for the development of new technologies related to enteral tube design, placement verification and securement.

Design and Methods

Design

This study used two voluntary surveys, one for parents/caregivers (called parents) and one for homecare providers, to better understand the incidence of enteral tube use in the homecare setting. The New Opportunities for Verification of Enteral Tube Location (NOVEL) project team members, comprised of nurses and physicians who care for pediatric patients in both the in-patient and homecare settings developed and reviewed the survey questions for content validity prior to distribution.

Sample

The populations of interest were parents and home healthcare providers caring for children in the home who required an NGT. Parents whose children were <18 years of age with an NGT in place at the time of survey completion were eligible. Any home healthcare company that employed home health nursing and supplied NGTs to pediatric patients were also eligible. Additionally, children with surgically inserted feeding tubes such as a gastrostomy tube were excluded from study participation. Both arms of this study were a convenience sample of persons who were contacted by email and voluntarily completed the online study survey. Some participants were referred by nurses who had knowledge of and/or had participated in the primary NOVEL study (Lyman et al., 2016). Other participants came from organizations associated with members of the NOVEL project, and companies with hospital affiliations or exceptional working relationships. Lastly, a web mail request of participating organizations in which members of the NOVEL project are affiliated were contacted for participation (Lyman et al., 2016).

Instrument

There were two separate survey tools composed of 13 items, one primarily directed toward parents and the other for health care providers. These tools were developed from a collection of questions compiled by the research team members, based on gaps in the literature and questions generated from clinical practice. The NOVEL team members reviewed the questions prior to implementation. The research team sought to have the survey be straightforward, easy to read, and short in length to encourage participants to complete all 13 questions. Descriptive information related to the patient population of interest including prevalence of NGT use, patient age, size of tube, frequency of NGT replacement and topics related to placement verification and misplacement in the home. Additional survey items included duration of NGT use, criteria used to determine need for tube change, identification of person (s) who change the NGT, identification of resources available for assistance with tube change, technique used to determine tube depth for placement, method for how NGT placement location is verified, and if adverse events have occurred during or immediately following NGT change, what actions parents or health care providers performed if such an adverse event arose. The questions were reviewed by the research team. Content validity was established for each instrument. Reliability was not tested prior to using either of the survey tools. The survey instruments are included as Fig. 1.

Procedure

The survey data instrument used the Survey Monkey® platform (<https://www.surveymonkey.com/>, n.d.) to house the web based questionnaires. Potential participants were given information about the survey and were encouraged to access the site and complete the survey. The researchers were only able to determine the number of participants based on the final count in the survey tally. There was no predetermined sample size due to the nature of the study and the solicitation of participants.

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