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Reasons and Frequency of Orogastric Tube Change in Preterm Infants by Nurses Working in Neonatal Intensive Care Units

Yenidoğan Yoğun Bakım Ünitelerinde Çalışan Hemşirelerin Preterm Bebeklerde Orogastrik Tüp Değiştirme Nedenleri ve Sıklığı

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Öz

Giriş ve Amaç: Prematüre bebeklerin beslenme destek yöntemlerinden orogastrik tüple enteral beslenme klinikte yaygın olarak kullanılmaktadır. Bu çalışmanın amacı prematüre bebeklerde orogastrik tüp değiştirilme nedenlerini ve sıklığını belirlemektir.

Gereç ve Yöntemler: Tanımlayıcı tipteki çalışma YYBÜ'lerde çalışan 154 hemşire ile yürütüldü. Verilerin toplanmasında hemşirelere yönelik 'Tanıtıcı Bilgi Formu' ve uzman görüşü alınarak geliştirilen 'Orogastrik Tüp Değerlendirme Formu' kullanıldı. Verilerin analizinde tanımlayıcı istatistiklerden yararlanıldı.

Bulgular: Araştırmaya katılan hemşirelerin yaş ortalaması 30,97±5,79, meslekte çalıştıkları yıl ortalaması 8,57±6,21 ve YYBÜ'de çalıştıkları yıl ortalaması 5,94±4,63 yıldı. Hemşirelerin %95,5'inin kadın olduğu, %73,4'ünün lisans mezunu olduğu, %90,9'unun 3. basamak YYBÜ'de çalıştığı ve %82,5'inin YYBÜ eğitimi aldığı belirlendi. En sık orogastrik tüp değişimi nedeni bebeğin orogastrik tüpü çıkarması (%98,1) idi. Orogastrik tüp değiştirme sıklığı gece vardiyasında daha fazlaydı. Ancak özellikle CPAP ile takip edilen bebeklerde orogastrik tüp değişimi sıklığının 2 kat (%71,4) fazla olduğu görüldü. Yüzüstü pozisyonda orogastrik tüp değiştirme sıklığının (%27,9) ve 12*1 ile beslenen pretermlerde orogastrik tüp değiştirme sıklığının (%73,4) daha fazla olduğu görüldü.

Sonuç: Orogastrik tüp değişiminin en sık nedeninin orogastrik tüpün sabitlenmesine bağlı problemler olduğu sonucuna varıldı.

Anahtar kelimeler: Bebek, Premature, Orogastrik tüp, Yenidoğan, Hemşireler

Abstract

Aim; Among nutritional support methods for preterm infants, enteral feeding via orogastric tube is widely used clinically. This study aims to determine the causes and frequency of orogastric tube replacement in preterm infants.

Method; The descriptive study was conducted with 154 nurses working in NICUs. 'Descriptive Information Form' for nurses and an 'Orogastric Tube Evaluation Form' developed with expert opinion were used to collect data. Descriptive statistics were used to analyze the data.

Results; The mean age of the nurses in the study was 30.97±5.79, the mean number of years working in the profession was 8.57±6.21, and the mean number of years working in the NICU was 5.94±4.63 years. It was found that 95.5% of the nurses were female, 73.4% had an undergraduate degree, 90.9% worked in a 3rd level NICU

and 82.5% had NICU training. The most common reason for orogastric tube replacement was the infant pulling out the orogastric tube (98.1%). The frequency of orogastric tube replacement was higher in the night shift. However, the frequency of orogastric tube replacement was 2 or more times (71.4%) especially in infants followed up with CPAP. It was observed that the frequency of changing the orogastric tube was higher in the prone position (27.9%) and the frequency of changing the orogastric tube (73.4%) was higher in preterm infants fed 12*1.
Conclusion; It was concluded that problems related to orogastric tube fixation were the most common reasons for orogastric tube replacement.

Keywords: Infant, Preterm, Orogastric tube, Neonatal, Nurses

1. Introduction

The World Health Organization reported that an estimated 13.4 million infants were expected to be born before 37 weeks of gestation in 2020, more than one in ten infants [1]. Preterm infants are born with immature systems, including the respiratory, circulatory, and gastrointestinal systems. Due to their inability to maintain their physiological needs such as breathing, maintaining body temperature, sucking, and swallowing, they are cared for and treated in neonatal intensive care units (NICU) until they are able to maintain their developmental characteristics [2]. It is extremely important to provide close follow-up to preterm infants who are immature in all aspects. One of the areas that require close follow-up is nutrition [2, 3]. Preterm infants with low nutrient reserves at birth are vulnerable to physiological and metabolic stresses that increase their nutritional requirements [4]. Therefore, providing support for optimal nutrition is one of the most important elements of care and survival for preterm infants [5]. Neonatal nurses have a primary role in feeding preterm and sick infants. Preparing for and assessing feeding is an important part of routine neonatal nursing care [6].

Due to uncoordinated sucking and swallowing, preterm infants younger than 32-34 weeks are fed through an orogastric tube (OGT) or nasogastric tube. The OGT is preferred for infants with respiratory distress. This is because they are mostly dependent on nasal breathing [7]. Among nutritional support methods for preterm infants, enteral feeding via OGT is widely used clinically [8]. Preterm infants, with their immature anatomy and physiology, are uniquely susceptible to complications of enteral feeding, leading to various safety concerns [5]. Placing a gastric tube is the fifth most painful procedure after nasal aspiration, tracheal aspiration, heel puncture and adhesive tape removal [9]. Acute painful stimuli to which the newborn is exposed trigger a stress response. This includes changes at the cardiovascular, respiratory, immune, hormonal, and behavioral levels [10]. Other complications include mucosal trauma, apnoea and bradycardia due to vagal stimulation, gastrointestinal bleeding [11], necrotizing enterocolitis, oxygen desaturation [12], epistaxis, pharyngeal perforation, esophageal rupture, bronchial/alveolar perforation, pneumonia, gastric/duodenal rupture, pneumothorax, malabsorption of drugs and nutrients due to positioning in the pylorus/duodenum, diarrhea, food intolerance, skin trauma due to tube fixation and replacement, complications that may develop due to orogastric tube use [13]. A recent study in preterm infants found that the most common problem causing skin trauma was related to medical adhesives [14]. During repeated procedures, nurses are responsible for minimizing, preventing and managing potential complications. They also have a crucial role to play in improving the safety and performance of feeding in preterm infants fed by enteral tube [5]. Given the complications, it is very important that protocols for replacing OGT in preterm infants are established and based on the best evidence. There is no comprehensive study in the literature that addresses why and how often OGTs get replaced. Therefore, this study aimed to determine the reasons for and frequency of replacing OGT in preterm infants.

2.Materials and Methods

Study Type and Sample

This descriptive study was carried out to determine the reasons and the frequency of the change of OGT in preterm infants. It was conducted between January and February 2022 in university/educational research/city hospitals and 2nd and 3rd level neonatal intensive care units (NICUs) in two cities of East Anatolia region. The study population consisted of nurses working in NICUs (N=186). As the study aimed to reach out to the whole population, it was decided that sampling was not required. The study was completed with 154 (82.7%) nurses who were working in the NICU between the specified dates and who agreed to take part in the study on a voluntary basis. OGT insertion and follow-up are performed by nurses in the designated hospitals.

Data Collection Tools

"The Introductory Information Form" and "the Orogastric Tube Evaluation Form" were used to collect data.

The Introductory Information Form: This form, designed by the researchers in accordance with the literature, consists of 7 questions to determine the socio-demographic characteristics of the nurses [15-17].

The Orogastric Tube Evaluation Form: It is a question form prepared by the investigators to obtain information about the frequency and reasons of OGT change in preterm infants. The form asks about the average frequency of OGT change in each shift, the average daily frequency of OGT change according to the status of infants with or without respiratory support, the factors that cause the most frequent OGT change in infants, and which infant feeding frequency increases the number of daily OGT changes [5,6,11,24]. For this form, which was created in accordance with the literature and clinical practice routines, opinions were obtained from four neonatal nurses with at least five years of clinical experience and two experts having a PhD. degree in child health and diseases.

Data Collection

The researchers collected the data from the nurses in the appropriate units of the clinics by using the face-to-face interview method. Each questionnaire form took an average of 10 minutes to complete.

Data Analysis

Computerized analysis was performed on the data obtained from the study. The arithmetic mean, the standard deviation, the median, the minimum, the maximum and the percentage test were used in the evaluation of the data.

Ethical Principles of the Study

Ethics committee permission dated February 10, 2022 and numbered 2022/02-37 was obtained from the Scientific Research and Publication Ethics Committee of XXX University for the conduct of the study. Furthermore, the purpose of the study was explained to the nurses before data collection and verbal and written consent was obtained.

3.Results and Discussion

The mean age of the nurses participating in the study was 30.97±5.79 years. The mean number of years in the profession was 8.57±6.21 years, and the mean number of years in the NICU was 5.94±4.63 years. It was found that 95.5% of the nurses were female, 73.4% had a bachelor's degree, 82.5% had received training in NICU, and 90.9% were working in a 3rd level NICU (Table 1).

In preterm infants, the frequency of OGT change was found to be higher in infants followed on night shift (2 or more times 57.1%) and CPAP (2 or more times 71.4%). In terms of infant position, the frequency of OGT replacement was higher in the prone position (27.9%). It was found that the frequency of OGT replacement was higher in infants fed 12*1 (73.4%) according to the frequency of feeding. The infant pulling out the OGT (98.1%) was the first reason for OGT replacement in preterm infants. The other reasons were as follows: fixation of the OGT to the intubation tube and replacement of the OGT with the tube (85.7%), displacement of the OGT (83.3%), replacement of the OGT during plaster change (76.6%), and occlusion of the OGT (41.6%) (Table

Table 1. Distribution of neonatal nurses according to their descriptive characteristics (n = 154)

Introductory Features		
	X̄±SD	**Med(Min-Max)**
Age	30.97±5.79	30.0 (22-47)
Years of working in the profession	8.57±6.21	8.0 (1-28)
Year of working in the NICU	5.94±4.63	4.0 (1-25)
	n	**%**
Gender		
Female	147	95.5
Male	7	4.5
Education Level		
Associate degree	18	11.7
Undergraduate	113	73.4
Postgraduate	23	14.9
Unit worked in		
2nd Level NICU	14	9.1
3rd Level NICU	140	90.9
Training in NICU		
Yes	127	82.5
No	27	17.5

Table 2. Reasons and frequency of orogastric tube replacement

	n	%
Mean frequency of OGT replacement according to nurses' shifts		
Day shift		
1 time	90	58.4
2 times	37	24.0
3 times or more	27	17.6
Night shift		
1 time	66	42.9
2 times	41	26.6
3 times or more	47	30.5
Mean frequency of OGT replacement according to respiratory status of preterms		
Infant monitored on mechanical ventilation		
1 time	66	42.9
2 times	48	31.2
3 times	22	14.3
4 times or more	18	11.7
Infant monitored on CPAP		
1 time	44	28.6
2 times	46	29.9
3 times	28	18.2
4 times or more	36	23.3
Infant with spontaneous breathing		
1 time	55	35.7
2 times	47	30.5
3 times	25	16.3
4 times or more	27	17.5
Frequency of daily OGT replacement according to feeding frequency in preterms**		
6*1 feed	33	21.4
8*1 feed	68	44.2
12*1 feed	113	73.4
24*1 feed	92	59.7
Continue feeding	67	43.5
Frequency of OGT replacement according to the position of preterms **		
Prone (face down) lying position	43	27.9
Supine (on the back) lying position	23	14.9
Most common causes of OGT replacement**		
Infant pulling out the OGT	151	98.1
Fixation of the OGT to the intubation tube and replacement of the OGT with the tube	132	85.7
Displacement of the OGT	129	83.3
Replacement of the OGT during plaster change	118	76.6
Occlusion of the OGT	64	41.6

*One person gave more than one answer.
** Those who answered 'yes' are included in the table
***The frequency of OGT replacement was expressed as an average value by nurses.

OGTs are used in infants admitted to the intensive care unit for a variety of indications, including gastric aspiration, feeding, drug administration, lavage, and decompression. Many complications can result from unnecessary repetition of the orogastric tube insertion procedure. In this context, it is critical that nurses, who are the primary caregivers, have good management of this process. This study aimed to determine why and how often OGTs are replaced in preterm infants.

As is the case in many intensive care unit practices, the fixation of the OGT is by means of adhesive tape or plasters [18]. Adhesive tape or plasters have the potential to cause serious damage to the skin if they are not used with caution [19]. Adhesives are known to damage the epidermis and sometimes even the dermis, both when placed and when removed. Peeling, tearing, maceration, bullae, chemical irritation and folliculitis are the most common skin injuries in neonates. [20, 21]. In our study, the most common reason for OGT replacement was inappropriate fixation. Similarly, it was also observed that the replacement of the patch used to fix the OGT was also the reason for the frequent replacement of the OGT. Various complications develop due to the repeated insertion of the OGT caused by the inadequate fixation and the replacement of the plasters. These complications are quite significant, as they are related to both the OGT and the skin integrity disruption.

The insertion of an orogastric tube has been shown to be a source of acute pain in neonates. This pain can alter preterm infants' brain structure and organization, as well as disrupt brain development through oxygen desaturation, leading to free radical formation that can damage rapidly growing tissues [22]. In a study by Cruz et al. (2016), the pain experienced by 34 neonates admitted to the NICU during orogastric tube placement was rated as severe [10]. Another study [23] found similar results. In our study, there was a clear pattern of OGT replacement in both day and night shifts, and this replacement was usually more than once. These frequent changes may be the cause of an increase in other complications, especially pain, in preterm infants.

The insertion of an OGT in preterm infants poses a risk to the developing esophagus [24]. It is essential to confirm the exact location of the OGT before starting feeding, as esophageal perforation is a rare but serious complication of gastric placement [25]. It is recognized that esophageal perforation is of greater concern, especially in the NICU with preterm infants and frequent procedures [26]. Another concern is placing and maintaining the OGT in the proper position during feeding. The rate of misplacement reported in the literature has ranged from 20 percent to 59 percent in infants and children. Misplaced tubes have been reported to be the cause of pneumothorax, hydropneumothorax, esophageal perforation, bladder perforation, and death [27]. Frequent replacement of the OGT may occur due to improper placement or displacement of the OGT after insertion. Displacement of the OGT was the most common cause of OGT replacement in our study. In addition, frequent feeding and prone position were found to be the causes of frequent OGT replacement. It is believed that frequent feeding and positioning may also be the causes of OGT displacement.

In our study, infant pulling out the tube was identified as the most common reason for OGT replacement. It was observed that the frequency of changing the OGT was higher in preterm infants supported by CPAP and breathing spontaneously compared to those receiving mechanical ventilation. Infants on mechanical ventilation are usually sedated. Therefore, their movements may be more restricted. Hence, more attention should be paid to the fixation of the OGT in preterm infants receiving CPAP support and breathing spontaneously.

No protocols for replacement frequency of OGTs were found in the literature. However, a few case reports and series have been reported from institutions with nursing policies requiring daily or frequent OGT replacement [24, 28, 29]. It should be emphasized to establish evidence and protocols for the frequency of OGT replacement and develop strategies to minimize or mitigate complications when evaluating the indications for these protocols [10].

Practice Implications

Nurses are health care professionals whose primary concern is the comfort of the infant. Nurses should aim to increase infants' comfort to find solutions to their physiological problems and reduce their feelings of stress when using OGT, which is one of the most important applications of nursing care. It is believed that identifying the reasons and frequency of OGT changes can be a guide for neonatal nurses who are responsible for the care of preterm infants. Identification of the reasons for repeated procedures will increase the professionalism of the nursing care.

Limitations

The study was limited to nurses working in the neonatal intensive care units in two provinces. The small number of nurses working in NICUs and some of these nurses refusing to participate in the study constituted a limitation. The relationship between the descriptive characteristics of the nurses who participated in the study and the frequency of OGT change could not be examined because the units in which they previously worked, the training they received for the NICU, and the schools from which they graduated were not homogeneous. Another limitation of the study was that it did not consider the number of patients per nurse in the units and the number of nurses on each shift.

4. Conclusion

The results of this study showed that the most common reason for the replacement of the OGT was the problems associated with the attachment of the OGT to the infant. It was concluded that the frequency of OGT replacement in preterm infants was influenced by the infant's breathing pattern, lying position, and feeding frequency. It is noteworthy that most of the reasons for OGT replacement are preventable and controllable. The

management of OGT is an important issue as it is a cause of serious complications in preterm infants. It is very critical that nurses, who have primary responsibility for inserting and replacing OGTs and feeding preterm infants in the NICU, are aware of the factors that lead to frequent OGT replacement and take precautions to prevent it. Developing new methods that do not harm the infant, especially for OGT fixation, and establishing evidence and protocols for the frequency of OGT replacement is also recommended.

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