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OPEN

# Nursing Difficulties and Issues in Endoscopic Sedation

## *Qualitative Research in Japan*

### ABSTRACT

Gastrointestinal endoscopic treatments have increased in Japan. Respiratory depression is as an unexpected development during sedation. This study aimed to clarify the sedation-related difficulties encountered by nurses involved in endoscopic treatment. Participants were five nurses who had worked for more than a year in the endoscopy department of a gastrointestinal endoscopy specialist guidance facility in Sapporo. Semistructured interviews were conducted. The number of recording units obtained was 129, which were divided into 12 categories and subdivided into 42 subcategories. The nursing practice difficulties related to sedation in endoscopic treatment were classified into two major categories: “difficulties in nursing practice” and “system difficulties.” All of the “difficulty in nursing practice” items were role-fulfilling difficulties involved in protecting patient safety and reducing anxiety and discomfort. Four of these items reflected difficulties related particularly to the role of the nurse in charge of the sedated patient in the endoscopy room. To reduce the difficulties encountered by nurses, a treatment environment system must be devised to ensure patient safety and improve the education support system for nurses with regard to sedation.

Endoscopic procedures have become common due to advances in minimally invasive medicine in Japan (Watanabe, Ohgami, Teramoto, & Kitajima, 1993). Therefore, gastrointestinal endoscopic treatment has spread even in early

cancer of the gastrointestinal tract (Kusano, Ikehara, Suzuki, Esaki, & Gotoda, 2018; Yao et al., 2019). For gastrointestinal endoscopy treatment, a tube with a small camera at the tip is inserted through the mouth or anus. The most frequently performed procedures are endoscopic mucosal resection, endoscopic submucosal dissection, polypectomy, and other tumor treatments, followed by treatment related to endoscopic retrograde cholangiopancreatography (ERCP) and for hemostasis (Yoshino et al., 2010). According to the Japanese Ministry of Health Labor and Welfare statistics for social medical practice (formerly the survey of social medical practice), the number of endoscopy treatments reached about 70,000 cases in 2017, with an increasing trend year by year (Ministry of Health Labor and Welfare, 2017). Sedatives are used in almost all cases during these processes (Tanabe et al., 2015).

Sedatives used in endoscopic procedures have a risk of severe respiratory depression that occurs rarely as unexpected symptoms. Unexpected symptoms caused by the use of sedatives include mild and moderate respiratory depression, circulatory depression, bradycardia, arrhythmia, anterograde amnesia, disinhibition, and hiccups (Obara et al., 2013). The incidence of unexpected symptoms after no treatment was reported to be 0.014%, and that of unexpected symptoms after

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treatment was reported to be 0.67%, according to national data from 2008 to 2012 of the Japan Gastroenterological Endoscopy Society (Furuta et al., 2016). Although the incidence of unexpected symptoms is extremely low, patients undergoing tumor treatment and ERCP are often deeply sedated, and this situation necessitates more sophisticated monitoring and skilled staff (Obara, 2017).

## Background

The role of nurses in gastrointestinal endoscopic treatment is to ensure patient safety (Japan Gastroenterological Endoscopy Society, 2017). While a patient is under sedation, the nurse must observe the patient's hemodynamics, maintain the patient in a comfortable position, secure personnel, manage drug administration, and help determine the patient's level of arousal (Tamura & Hoshino, 2015, pp. 164–166). Therefore, attending nurses must monitor the effects of sedatives on the patient's respiratory and circulatory systems to monitor for possible dangers. However, nursing staff members may not be skilled enough in dealing with sudden changes in patients under sedation (Suzuki, 2014). In addition, nurses must have knowledge about sedation (Sugawa & Tohda, 2007), but education about sedation for nursing practice is not sufficient (Gotoda et al., 2020).

The first author had a troubled experience in which the patient moved and was sedated poorly in the endoscopy room. Previous studies have reported changes in the respiratory and circulatory dynamics of patients undergoing treatment and changes in body movements, sweating, and facial expressions during treatment as risk factors observed by nurses involved in endoscopic treatment (Miyajima, Osaka, Koide, & Takehara, 2015). Currently in Japan, there are no endoscopy nurse specialists (Ohashi, 2003) and qualified gastrointestinal endoscopy technicians (i.e., nurses) are not allowed to administer sedatives (Japan Gastroenterological Endoscopy Technicians Society, 2008).

Therefore, it is presumed that nurses involved in endoscopic treatment have difficulties in nursing practice related to sedation. So far, there has been no previous study focusing on the sedation concerns of nurses involved in endoscopic treatment. From the above, it is important to clarify the details about the difficulties in nursing practice of nurses involved in sedated endoscopic treatment. To understand the detailed content of nursing difficulties related to sedation, we conducted this study to further explore the problems associated with sedation in endoscopic nursing practice.

## Methods

### Study Design

The study design was qualitative descriptive.

### Participants

Among the facilities in the city of Sapporo, Japan listed as gastroenterological endoscopy specialist guidance facilities (as of December 2017), 31 have a track record of treatment (search date: January 5, 2018) (Japan Gastroenterological Endoscopy Society, 2017). From these 31 facilities, we selected five for this investigation which individually have departments specializing in endoscopy under the names “Endoscopy Center” and “Optical Medical Department.” For the interviewees we chose full-time nurses who had at least 1 year of clinical nursing experience working with endoscopic treatment. We assumed that nurses with more than a year of work experience in the endoscopy setting could give their views on the difficulties in nursing practice when patients use sedatives. Furthermore, we speculated that by broadly including the number of years of clinical experience in nursing for study, it would be possible to further clarify the full extent of these difficulties in nursing practice. Part-time nurses and nursing managers were excluded. By targeting one facility to one person, we avoided duplication of the system for practicing nursing and the system for supporting education at the same facility. Furthermore, the number of subjects was set to five nurses in anticipation of theoretical saturation due to repeated data collection and analysis, and for the feasibility of the study.

### Data Collection

The interview guide was created with reference to previous research (Nagayama, Shirao, & Nozawa, 2011; Nakagomi & Endo, 2016). Using the interview guide, we conducted semistructured interviews as follows. The content of the interview guide was categorized into three periods (before sedation, during sedation, and after sedation) in which a nurse was involved in endoscopic treatment while the patient was under sedation. For the interview location, the first choice was the facility where each nurse practices. Each interview was conducted in a private room with a relaxed atmosphere. The first author was assigned as the interviewer for all of the interviews, which lasted for 30–40 minutes each. The interviewer met the research participants for the first time after introducing herself via a previously mailed letter. This interview was a one-time interview involving one participant and one researcher. All interviews were recorded on an integrated circuit (IC) recorder, and notes were taken when necessary.

### Ethical Considerations

The study protocol conformed to the guidelines on research ethics, knowledge necessary for conducting research, and education and training in technology, with the approval of the Sapporo City University

Graduate School of Nursing (approval number: 2018 No. 36).

## Data Analysis

A verbatim transcript was created from the interviews recorded on the IC recorder, and meaningful groups were used as the recording units. After individually separating each recording unit of each participant, the three main axes of “before sedation,” “during sedation,” and “after sedation” were divided chronologically into scenes wherein the nurse was involved in patient care. Thereafter, we integrated the recording units for five people. After classifying the narrative summaries by increasing the abstraction level while paying attention to differences and similarities, we generated subcategories and categories.

The interview content was analyzed using the content analysis method of Berelson (1952). Content analysis is a survey method for an objective, systematic, and quantitative description of the explicit content of communication (Funashima, 2007). To examine content validity, that is, whether classification categories and subcategories were appropriately labeled, we repeatedly discussed this matter with department supervisors and other graduate students in order to minimize the effects of the researcher’s preconceptions and biases and to ensure validity. Moreover, at the end of each interview, verbal confirmation was obtained that the content of the difficulties understood by the researcher was not different from the content of the narratives of the interviewees. In this way, data distortion was avoided, and reliability was ensured.

Reliability was also confirmed at the recording unit (coding) stage to examine the degree of consistency of the coding results between coders (analytical workers). First, the first coder was the interviewer, and the second coders were the graduate nursing students who had qualifications as intensive care certified nurses and nursing experience with patients receiving ERCP-related emergency treatment. We then confirmed the

reliability of the code for each recording unit. In this method, the reliability was calculated by the ratio of the number of categories for each variable.

$$\text{Matching rate} = \frac{\text{Number of matched date}}{\text{Number of matched date} + \text{Number of mismatched date}} \times 100\%$$

In this analysis method, if the match rate is 90% or higher, an acceptable level of understanding is achieved, and a different interpretation is unlikely to apply (Arima, 2007). The first concordance rate was 92.1% (129 matching data and 11 mismatched data). Then, we conducted repeated discussions and repeated coding until we reached the match rate of 100%.

## Results

### Outline of Research Participants

The five participating nurses working at five different facilities had an average of 22.4 years of experience as nurses and 10.0 years of experience in the endoscopy unit. Four of them were qualified gastrointestinal endoscopy technicians (i.e., nurses), and two were chief nurses. One nurse also worked in a fluoroscopy room (Table 1). Interviews were conducted at their respective hospital facilities, and one was conducted at a graduate school. Each nurse underwent interview once, and the mean interview time was 57.6 minutes (44–71 minutes).

### Categories and Subcategories of the Difficulties Nurses Experience in Relation to Sedation in Endoscopic Treatment

As a result of analyzing the qualitative data about the difficulties experienced by nurses, 42 subcategories and 12 categories were extracted from 129 recording units. The difficulties were classified into “difficulties in nursing practice” and “system difficulties.” The “difficulties in nursing practice” items were classified into seven categories and 25 subcategories (Table 2). The “system difficulties” items were divided into five categories and 17 subcategories (Table 3). The

**TABLE 1.** Characteristics of the Study Subjects

Participants	Years as NS	Years as ENE	Position	GETQ	Work Style	Interview Time (Minutes)	Term Mean Interview Time
A	18	14	Chief	Yes	FT	71	+18.4
B	27	7	Chief	Yes	COC	55	-2.6
C	30	10	Staff	Yes	FT	44	-13.6
D	11	11	Staff	No	COR	67	+9.4
E	26	8	Staff	Yes	COC	51	-6.6

*Note.* COC = concurrent outpatient clinic; COR = concurrent observation room; ENE = endoscopic nursing experience; FT = full time; GETQ = gastroenterology endoscope technician qualification; NS = nurse.

**TABLE 2. Nursing Practice Difficulties Experienced by Nurses Engaged in Endoscopic Procedures Under Sedation**

Category	Subcategory (Real Recording Unit Number)
Difficulty in maintaining the safety of sedated patients	When the patient suddenly moves, it is difficult to maintain safety (6)
	When using midazolam, patients become agitated and difficult support (5)
	Need to deepen the sedation of excited patients or being troubled because there is no best way to restrain the patient (3)
	Patients who continue to be affected by drugs have difficulty understanding the need to rest after the procedure (3)
	Addition of more midazolam may cause agitation in a patient who is disturbed by midazolam (2)
	Watching a sedated patient requires more manpower (2)
Difficulty in assessing the respiratory status including hypoventilation	It is difficult to observe the respiratory status by observing the patient's complexion and chest movements (5)
	Evaluation of the patient's respiratory state using only the SpO <sub>2</sub> index failed to evaluate ventilation abnormalities (3)
	The patient's respiratory rate and the presence or absence of breathing cannot be observed using the vital function monitor for indicating the ventilation status (3)
Difficulty in achieving the optimal amount of sedation	We are hesitant to add sedatives because there is a difference between doctors regarding the amount of sedatives to be used (4)
	When we think that the initial dose prescribed by the doctor is high, we still must adjust the dose to the doctor's order (3)
	We are in a situation where the first dose to a patient makes the patient oversedated (2)
	When we add sedatives without considering the pharmacological action time, patients may be oversedated (2)

(continues)

**TABLE 2. Nursing Practice Difficulties Experienced by Nurses Engaged in Endoscopic Procedures Under Sedation (Continued)**

Category	Subcategory (Real Recording Unit Number)
Difficulty in performing optimal sedation	Sometimes patients complain about sedative effects (4)
	Just visually observing the patient being treated resulted in the difficulty of not knowing the patient's arousal level and not knowing the point at which to add a sedative (3)
	There are times when doctors start treatment before the optimal sedation level is reached (3)
Difficulty of getting the patient immediately before treatment to understand the effect of sedation	When we did not administer the drug to patients in small doses, the patient becomes oversedated and requires intubation (3)
	We struggle to explain sedative effects to patients just before treatment that they do not expect (3)
	Patients may not read the content of the consent form regarding sedative use (2)
Difficulties playing a role in managing the holistic aspects of sedated patients	It is difficult to report the patient's vital signs to the doctor who is concentrating more on the treatment procedure (3)
	It is difficult to determine the need for additional sedatives under the guidance of a doctor (2)
	The absence of an anesthesiologist is felt where nurses are in charge of systemic management of sedated patients (2)
Difficulty avoiding respiratory arrest	When the patient did not receive the drug in small doses, the patient was oversedated and had an unanticipated intubation (2)
	When sedatives and analgesics were combined, we were in trouble because the patient had stopped breathing (2)
	When controlling the patient's spontaneous breathing, we are in a situation where patients need antagonists (2)

**TABLE 3. System Difficulties Experienced by Nurses Engaged in Endoscopic Procedures Under Sedation**

Category	Subcategory (Real Recording Unit Number)
Insufficient system to conduct pre-sedation evaluation	Insufficient time to collect information (5)
	We utilize the personal information of patients, but there is a limit to the collection of information necessary for treatment (4)
	We are in a situation where we have insufficient information from patients just before treatment (4)
	Hesitate to use excitable drugs if the patient lacks information about whether they are taking antidepressants and history of drinking (3)
	It is difficult to connect patient information to treatment (2)
Inadequate learning system for sedation	The creation of a manual for responding to sudden changes and a system for planning simulation training has not been established (5)
	Confirmation and lack of learning of staff regarding sedation knowledge (4)
	Difficulty in utilizing existing sedation scale for gastrointestinal endoscopic treatment (4)
	The study session on sedation by anesthesiologists and gastroenterologists was not implemented (3)
Insufficient safe treatment environment for sedated patients	We are troubled because the administration method of the drug is not standardized (3)
	Since the endoscope room is a private room, it is difficult for other staff to understand the patient is in trouble (2)
	There are not enough beds in the recovery room (2)
	In the endoscopy room, it is not possible to install the equipment and equipment necessary for sudden changes in patients (2)

(continues)

**TABLE 3. System Difficulties Experienced by Nurses Engaged in Endoscopic Procedures Under Sedation (Continued)**

Category	Subcategory (Real Recording Unit Number)
Lack of an observation system for patients with insufficient arousal	We are troubled because we do not have a monitoring system that considers the possibility of respiratory depression and re-sedation of patients in the recovery room (5)
	Since there is no indicator of wakefulness from sedation, there is no standard of readiness for patient discharge (3)
Unsupported system during emergency endoscopic treatment	Manpower shortage during emergency endoscopic treatment (2)
	Lack of additional assistance during emergency endoscopic treatment (2)

categories are indicated by square brackets, and the subcategories are indicated by curly brackets. The recording unit real number is indicated by parentheses {(recording unit real number)} in the subcategory. The actual participants' narratives are shown in italics. Participants are referred to as "A," "B," "C," "D," and "E," and the number is the participant's record unit number.

### Characteristics of the Content of Difficulties Nurses Experience in Connection With Sedation in Endoscopic Treatment

This study does not seek to explain all the results, but rather to identify the characteristic results of nurses associated with sedation in endoscopic treatment.

#### Contents of the Characteristics of "Difficulties in Nursing Practice"

##### *[Difficulty in Maintaining the Safety of Sedated Patients]*

This category captures the difficulty of keeping a patient safe when the patient moves during sedation. The collaborators experienced that patients suddenly awakened and they could not prevent unsafe patient behavior. {When the patient suddenly moves, it is difficult to maintain safety (6)}.

##### *[Difficulty of Assessing the Respiratory Status Including Hypoventilation]*

This category captures the difficulty of assessing the respiratory status of a sedated patient. The nurses felt that it was difficult to observe the respiratory

condition because it was difficult to understand the patient's facial color and thorax movement via visual observation as necessary when observing the patient's respiratory condition during sedation. {The patient's respiratory rate and the presence or absence of breathing cannot be observed using the vital function monitor indicating the ventilation status (3)}. Participant (E20) reported, "*Since we use SpO<sub>2</sub> as an index, we have not been able to utilize capnography, which can detect respiratory arrest in patients immediately.*"

#### **[Difficulty in Performing Optimal Sedation]**

In this category, it was considered difficult to reduce the patient's anxiety and discomfort even with the use of sedatives. It was reported that the effects of sedatives were not constant, and that it was not always easy to reduce patient anxiety and discomfort. {Sometimes patients complain about sedative effects (4)}.

#### **[Difficulties Playing a Role in Managing the Holistic Care of Sedated Patients]**

This category captures the difficulties in performing the role as a nurse who is responsible for sedation of patients undergoing endoscopy treatment. {The absence of an anesthesiologist is felt where nurses are in charge of systemic management of sedated patients (2)}.

### **Characteristics of "System Difficulties"**

#### **[Inadequate Learning System for Sedation]**

Difficulties in this category were based on the lack of an education and support system that could cultivate knowledge about drugs used for sedation that is necessary for nurses to enhance their responses and judgments in case of sudden patient changes due to sedation. Regarding the education status of the nursing staff, {the study session on sedation by anesthesiologists and gastroenterologists has not been implemented (3)}. Furthermore, after the patient's condition suddenly changed, {the creation a manual for responding to sudden changes and a system for planning simulation training has not been established (5)}. In addition, we reported feeling the need for immediate implementation of a learning system for sedation.

#### **[Insufficient Safe Treatment Environment for Sedated Patients]**

In this category, the environment to provide safe medical care to sedated patients was insufficient; based on the characteristics of sedation, the drug should be administered after securing venous vascular access. {We are troubled because the administration method of the drug is not standardized (3)}. Participant (A29) reported that: *The problem was that without the doctor's instructions, venous access could not be ensured*

*for all patients and we were skeptical of patient safety and administered sedatives.*

## **Discussion**

### **Characteristics of Difficulties in Performing the Role of Nurses From "Difficulties in Nursing Practice"**

The challenge of the role of a nurse is presumed to be the difficulty of maintaining the safety of sedated patients. [Difficulty in maintaining the safety of sedated patients] is that it is impossible to judge the degree of awakening of the sedated patient and it is difficult to predict sudden movement of the patient. There is no best way to predict patient movement (Miyajima et al., 2015). Originally, the purpose of using sedatives is to reduce the movement of the patient inadvertently, so that the treatment can be performed smoothly. Nevertheless, the difficulties caused by the inability to control the patient's body movements are considered to be an experience of nurses involved in sedative endoscopic treatment. In this situation, the problem of sedation in endoscopic medical care in Japan is that inappropriate drugs are used such as benzodiazepine sedatives (Obara, 2017) that may have a side effect of excitement (Nori, 2016). In other words, the informants in this study were unable to adequately play a role in protecting patients' safety, and they had difficulties in situations where sedative use did not reliably control patient movement.

Next, regarding the [difficulty in assessing the respiratory status including hypoventilation], it is speculated that the difficulty of respiratory evaluation of hypoventilation is due to the difficulty of assessing the respiratory status of patients who are constantly sedated. It is important to observe respiration thoroughly and try to detect abnormalities early in order to assess the respiratory condition of the patient during sedation (Katada & Tanaka, 2008). In this study, informant said it was difficult to constantly visually observe the patient's complexion and chest movements. In addition, one informant said, "We have not been able to utilize capnography that can detect that the patient's breath stopped before SpO<sub>2</sub>." Therefore, we believe that the situation in which it was not possible to immediately observe whether or not the patient was breathing was causing difficulties.

For these situations, it has been suggested that the most useful monitor during sedation is the exhaled carbon dioxide monitor, which promptly and reliably informs of respiratory problems, rather than SpO<sub>2</sub> (Horimoto, 2013). In addition, in the operating room, anesthesiologists utilize a helpful monitor to assess the full physical status of the patient. According to the Japanese Society of Anesthesiologists (2014),

“Monitoring Guidelines for Safe Anesthesia” has been created regarding the use of these monitoring devices. It states that the patient’s status is “observed” rather than “monitored.” In other words, we think it emphasizes the importance of “looking carefully” rather than “seeing.” From the above, it is not always possible to observe with the nurse’s “eyes,” and since a biological monitor based on both the oxygenation index and the ventilation index cannot be used, the patient’s abnormality cannot be detected immediately. Therefore, it was suggested that it is necessary to provide a full-time nursing system and monitoring device that allows full-time observation of patients as a necessary system for early detection of respiratory depression.

Next, regarding the [difficulty in performing optimal sedation], it is presumed that the difficulty of performing optimal sedation is due to the difficulty of reducing anxiety and discomfort of the patient even if a sedative is used. Nurses in the endoscopy room are required to constantly observe the patient and attempt to reduce the patient’s anxiety and distress (Arai, Abe, & Oshima, 2006). However, the informants of this study said, “There are times when patients complain about the sedative effect, which is a problem.”

In order to reduce the anxiety and discomfort of the patient due to the insertion of the endoscope, nurses involved in endoscopy treatment work intervene by talking to the patient and providing touch as needed to try to alleviate the patient’s anxiety and discomfort. Such involvement with the patient is the most important role of the nurse in the endoscopy room. However, it is presumed that the informants could not objectively evaluate whether or not the patient was awake only by visual observation, which made it difficult to reduce the anxiety and discomfort of the sedated patient.

### Need for Support to Reduce Difficulties of the Nurse due to “System Difficulties”

Regarding the [insufficient safe treatment environment for sedated patients], the lack of a safe treatment environment system for sedated patients resulted in difficulties because the treatment environment of the endoscopy unit and the safety management system of the hospital organization were still unestablished. Compared with conventional laparotomy, gastrointestinal endoscopic treatment can maintain the patient’s activities of daily living and quality of life, enabling “1-day surgery” and “1-day hospitalization surgery.” Since 1994, after the official approval for payment by the medical insurance system, this modern procedure continues to evolve as the first treatment choice for early cancer. However, creating a safe treatment environmental system is necessary to ensure patient safety in the nursing practice of “1-day surgery” and “1-day hospitalization surgery” (Nakamura, 2001). This study

reported that even when esophageal dilatation was performed, vascular access was not secured under the physician’s order. The system of introducing sedation for endoscopic treatment needs to be improved to provide a better and safer medical environment.

Medical safety measures for hospital organizations cannot be easily improved by individual efforts alone. Japan has become a superaged society where elderly patients have become prominent, and the use of sedatives in the elderly has a greater impact on the respiratory circulatory system and a higher risk of accidents than in the young (Nishizawa, Kiguchi, Mitsunaga, Akimoto, & Yahagi, 2017). Norii (2016) mentioned that, in principle, a person in charge of patient care is always required, and a monitoring staff is needed. Hence, to provide a better and safer medical environment for patients receiving endoscopic treatment, a nursing system that allows full-time monitoring of patients is necessary.

As mentioned, if the patient’s respiratory condition cannot be observed visually, it should be evaluated using a monitoring device. CO<sub>2</sub> exhalation should be monitored for all patients with moderate sedation or higher (Komazawa & Kaminoh, 2014). Respiratory management in both oxygenation and ventilation ways should also be provided, using a ventilation index monitor as well. As a system support for minimizing the difficulty of nurses working in sedated endoscopic treatment, a nursing system that allows full-time observation of patients and the observation of each patient’s respiratory state is needed.

Next, regarding the [inadequate learning system for sedation], lack of more specialized knowledge and skills to manage the holistic care of sedated patients was noted. In order to perform endoscopy treatment safely and without pain, and to reduce the incidence of accidents, nurses need to know the general condition of the patient and have sufficient knowledge about sedatives (Inui, 2003). Nurses need to be prepared to recognize the patient’s changes at an early stage through proper monitoring and intervene appropriately when something happens. In this study, the participants hope to establish a system for preparing manuals and simulation training for responding to sudden patient changes in status. The sedation staff must have pharmacological knowledge of sedation and analgesics, accurately determine the physiological response of sedation and anesthesia, and be familiar with anesthesia and first aid (Suzuki, 2019). In other words, it is presumed that nurses involved in sedation management need an educational support system to respond appropriately to sudden changes.

In some countries, trained nurses can practice sedation management using propofol drugs (Liu et al., 2009; Nilsson et al., 2015; Vargo, 2004). However,

propofol has no antagonist, and if the patient's host defense reflex disappears, nurses need to immediately take measures to secure the airway. Therefore, if a nurse is in charge of sedation, the patient's safety cannot be guaranteed unless the nurse is familiar with pharmaceutical rescue (Covington, Muckler, Sheldon, Alexander, & Morgan, 2019). In addition, gastrointestinal endoscopy treatment is a situation where many occupations could experience the reality of collaboration in the workplace (Ohashi, 2003). Therefore, in the event of unforeseen circumstances due to the use of sedatives, in situ simulation training for life-saving treatment by the medical team is considered to be necessary support.

Further, in order to improve medical safety related to sedation, anesthesiologists with a wealth of knowledge and experience in sedation and analgesics and gastroenterologist concerned need to cooperate (Komazawa et al., 2014). Lazarus (1999) stated, "People are more challenged than threatened if they are confident in their ability to overcome obstacles and crises." Acquiring skills and having confidence change the perception of difficulties. We suggest that learning how to improve abilities will allow nurses to realize the need and growth of their sedation skills, rather than having a difficult experience when encountering unexpected patient changes in status.

### Limitations

This study was sampled in only one city because of the feasibility of the authors while in graduate school. This sample was limited to five nurses who had more than 1 year of endoscopy unit experience at five facilities in Sapporo city. Thus, the results obtained here may not apply to all nurses involved with sedation during endoscopic treatment. There may also be differences in the degree of difficult experiences each nurse has and how they perceive the difficulty. Moreover, it is also possible that participants could have overstated the difficulty of the treatment environment. Thus, their recall of the difficulty might be biased because they were asked to talk only about difficulties related to sedation during endoscopic treatment instead of other sedation experiences in other settings.

Because there are very few previous studies of endoscopic nursing in Japan, there was no evidence to guide the development of the interview questions. In addition, in analyzing the results, the number of participants was set to five in consideration of theoretical saturation, considering that new results will not be produced even if the number of participants is increased. While we believe this qualitative research was valid to clarify the experiences of the nurse, difficulties in the endoscopy room, it is very difficult to develop a general theory from the small amount of

data. Therefore, future investigation to obtain a causal relationship through quantitative research is recommended.

### Implications for Practice

Nurses in countries other than Japan, who lack guidelines or standards for endoscopic nursing related to sedation, may be able to help take steps as outlined in this study to alleviate the difficulties experienced.

### Conclusions

The experiences of nursing practice difficulties related to sedation by nurses involved in endoscopic treatment were classified into two main categories: "difficulties in nursing practice" and "system difficulties." The "difficulties in nursing practice" category was subdivided into seven subcategories, and the "system difficulties" category was subdivided into five subcategories. In the "difficulty in nursing practice," four difficulties were considered to be related particularly to the role of the nurse in charge of the sedated patient in the endoscopy room. These included [difficulty in maintaining the safety of sedated patients], [difficulty in assessing the respiratory status, including hypoventilation], [difficulty in performing optimal sedation], and [difficulties playing a role in managing the whole body of sedated patients]. All of the "difficulty in nursing practice" items were difficulties in fulfilling roles in which nurses protect patient safety and reduce anxiety and discomfort.

The following were considered possible ways to reduce the difficulties of nurses: establish a system for detecting respiratory depression at an early stage and devise an educational system that incorporates both information about sedation and resuscitation training. The issues of the treatment environment system are as follows: the nursing system needs to observe patients on a full-time basis. Respiratory management should utilize not only the oxygenation index monitor but also the ventilation index monitor. The challenge of the learning content is as follows: creating a manual that can guide nurses to respond to sudden changes in patients's status, a simulation training plan, confirmation of staff sedation knowledge, use of learning activities and lectures on sedation and how to evaluate the sedation scale, and conducting a study session on sedation by anesthesiologists and gastrointestinal endoscopists. If these problems are resolved, it is presumed that nurses will be confident in their role caring for sedated patients and able to reduce their difficulties. A treatment environment system that ensures patient safety and improves the education support system for nurses regarding sedation is critical. It was suggested that nurses would link the lessons learned from training to nursing practice so that sedation knowledge would be enhanced along with patient safety. ✪



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