

Nursing Competencies for Pediatric Gastrointestinal Endoscopic Examinations and Treatments

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Abstract

Background: With rapid advancements in endoscopic technology, the application of endoscopy has expanded from adults to children. Although nursing care for pediatric gastrointestinal endoscopy differs fundamentally from that for adults, the competencies required for pediatric gastrointestinal endoscopy nursing have not yet been clearly defined. Therefore, this study explored the components of nursing competencies perceived by nurses to be necessary for providing care during pediatric gastrointestinal endoscopic examinations and treatments.

Methods: The participants were 12 nurses engaged in the care of children undergoing pediatric gastrointestinal endoscopic examinations and treatments. Data were collected through semi-structured interviews and analyzed using qualitative inductive analysis.

Results: Five core competencies were identified: "the ability to anticipate pediatric vulnerabilities and ensure safety," "the ability to promote acceptance of medical procedures by understanding children's cognitive and emotional states," "the ability to support parents in accepting and adapting to pediatric endoscopic procedures," "the ability to promote multidisciplinary collaboration and coordinate the progress of pediatric endoscopic procedures," and "the reflective and developmental abilities required to maintain and enhance pediatric gastrointestinal endoscopy nursing practice." These competencies were not independent; rather, they functioned interdependently. They centered on ensuring safety in light of children's vulnerability while simultaneously supporting children and parents, coordinating examination progress through interprofessional collaboration, and maintaining and developing nursing competencies through reflection and experiential learning.

Conclusions: Ensuring safety based on pediatric vulnerability was considered the foundational competency underlying pediatric gastrointestinal endoscopy nursing. The findings suggest that the identified nursing competencies may provide a basis for assessing nursing competency levels and for developing educational interventions and educational systems in pediatric gastrointestinal endoscopy nursing.

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Introduction

With rapid advancements in endoscopic technology, the application of endoscopy has expanded from diagnostic examinations to therapeutic interventions and from adults to children. Particularly in the management of gastrointestinal diseases, gastrointestinal endoscopic examinations and treatments have advanced considerably due to increased demand driven by public awareness of disease prevention and advances in minimally invasive therapies [1]. In recent years, the increasing prevalence of pediatric inflammatory bowel disease and eosinophilic gastrointestinal disorders has made pediatric gastrointestinal endoscopy an essential tool for diagnosis and treatment. Moreover, advances in medical devices, including small-diameter endoscopes, have enabled examinations and interventions in younger children, including newborns, thereby expanding the scope of pediatric gastrointestinal endoscopic procedures [2].

Nursing care for pediatric gastrointestinal endoscopy differs fundamentally from that for adults. This is because children differ from adults not only in physical size but also in disease characteristics, physiological development, drug metabolism, and risks associated with procedures [3,4]. For example, the *2017 Guidelines for Pediatric Gastrointestinal Endoscopy* [2] recommend sedation to ensure that children can safely undergo endoscopic procedures. However, the risks associated with sedation and anesthesia increase in younger children [5]; therefore, safety management during pediatric gastrointestinal endoscopy is a critical responsibility of nurses. Nurses must provide care based on specialized knowledge of pediatric physical assessment, disease characteristics, and pharmacokinetics.

In addition, nursing support tailored to children's developmental stages is essential in pediatric gastrointestinal endoscopy. Many children experience distress and anxiety related to pre-procedure medication administration and the examination itself, while parents have reported concerns regarding complications associated with endoscopy and sedation/anesthesia [6]. Therefore, nurses need to establish supportive relationships with children and their parents before the procedure and help children prepare psychologically. This includes explaining procedures in ways appropriate to children's cognitive developmental levels and engaging with children and parents to enhance their coping abilities [7,8]. Through such approaches, nurses can support children in actively participating in their examinations and treatments [9-11]. Thus, children undergoing gastrointestinal endoscopic procedures require nursing care that differs substantially from adult care. Establishing and enhancing pediatric gastrointestinal endoscopy nursing is essential to ensure that children experiencing anxiety before hospitalization can undergo procedures safely and comfortably.

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However, pediatric gastrointestinal endoscopy nursing remains underdeveloped as a specialized area of practice. Nurses involved in endoscopic examinations and treatments have varying levels of clinical experience, and although education tailored to these differences is needed, educational systems have not yet been sufficiently standardized [1]. Although an endoscopy nursing education guideline based on the Clinical Ladder framework has been proposed [12], it primarily focuses on adult gastrointestinal endoscopy nursing, and research examining the specific competencies required for pediatric gastrointestinal endoscopy nursing remains limited. Furthermore, despite the publication of the *2017 Guidelines for Pediatric Gastrointestinal Endoscopy* [2], the nursing competencies required for nurses involved in pediatric gastrointestinal endoscopic procedures have not yet been clearly defined. Nursing competency has been defined as the ability of nurses to effectively demonstrate a combination of personal characteristics, professional attitudes, values, knowledge, and skills in order to fulfill their professional responsibilities through clinical practice [13]. Clarifying the competencies specific to pediatric gastrointestinal endoscopy nursing is therefore essential for establishing an educational framework that supports competency development. Without such a framework, competency development depends largely on individual nurses' self-directed learning, which may result in inconsistencies in competency acquisition and variability in the quality of nursing care provided.

Therefore, this study aimed to explore the components of nursing competencies required for pediatric gastrointestinal endoscopy nursing by asking frontline nurses who provide this care to identify the competencies they perceive as necessary. We anticipate that identifying these components will contribute to clarifying and advancing the professional practice of pediatric gastrointestinal endoscopy nursing and provide a foundation for developing educational materials, such as manuals and checklists, as well as establishing a structured educational framework. Furthermore, enhancing nurses' practical competencies may help establish a care system that enables pediatric patients and their families, who often experience anxiety when undergoing hospitalization and procedures, to receive endoscopic examinations and treatments safely and with confidence.

Study Aim

Therefore, this study explored the components of nursing competencies perceived by nurses to be necessary for providing care during pediatric gastrointestinal endoscopic examinations and treatments.

Methods

Research design

This study employed a qualitative descriptive research design using semi-structured interviews. This approach was considered appropriate for exploring and interpreting the meanings embedded in nurses' accounts of their clinical experiences.

Participants

The participants were nurses working in endoscopy units at three medical institutions in western Japan that provide pediatric gastrointestinal endoscopic examinations and treatments. The inclusion criteria were as follows: (1) experience providing care for children younger than 16 years undergoing gastrointestinal endoscopic examinations and treatments (i.e., upper gastrointestinal

endoscopy and colonoscopy); and (2) voluntary agreement to participate after receiving a full explanation of the study purpose and procedures. Nurses who worked exclusively in highly specialized procedures, such as small bowel endoscopy, endoscopic retrograde cholangiopancreatography (ERCP), or laparoscopic surgery, were excluded because these procedures involve specialized technical and surgical aspects beyond the scope of this study.

Data collection methods

First, the purpose and procedures of the study were explained to the directors of nursing at the participating institutions, and permission to conduct the study was obtained. The researchers subsequently contacted nurses who had expressed willingness to participate through the directors of nursing and arranged the interview date, time, and location. Interviews were conducted in private rooms at the participants' workplaces to ensure confidentiality and privacy.

At the beginning of each interview, basic demographic information was collected. Semi-structured individual interviews were then conducted using an interview guide (Table 1). The interviews explored current nursing practices and challenges in pediatric gastrointestinal endoscopic examinations and treatments, as well as participants' perceptions of the nursing competencies they considered necessary for clinical practice. Each participant was interviewed once. With participants' consent, interviews were audio-recorded using an IC recorder, and relevant nonverbal observations were documented in field notes when necessary. Data collection was conducted from June to August 2025.

Analysis

The audio recordings were transcribed verbatim and analyzed using qualitative inductive analysis [14]. This approach was selected because it enables systematic exploration of the meanings embedded in nurses' experiences and facilitates the identification of components of nursing competencies in pediatric gastrointestinal endoscopy nursing.

First, the transcripts were read repeatedly to gain an overall understanding of the data. Second, statements related to nursing competencies considered necessary for pediatric gastrointestinal endoscopic examinations and treatments were extracted and coded while maintaining their original context and meaning. The first and second authors jointly coded the first transcript. The first author then coded the remaining transcripts, while the second author independently double-checked the extracted codes. Third, codes were compared based on similarities and differences, and related codes were grouped into categories. Finally, the categories were further integrated into themes to capture the core competencies perceived by nurses as necessary for pediatric gastrointestinal endoscopy nursing practice. The third and fourth steps were conducted by the first author, and the thematic framework developed through these processes was reviewed by the second author. When differences in interpretation arose, the researchers revisited the relevant transcript passages and discussed the meanings conveyed by the participants until consensus was reached. The final thematic framework was also discussed with the last author to ensure that it adequately reflected the participants' accounts.

The analysis was conducted iteratively on a case-by-case basis. As additional interviews were analyzed, newly obtained data were continuously compared with existing codes, categories, and themes.

Table 1: Selected Questions from the Interview Guide

Interview Guide
Opening Question
Could you describe how nursing care for pediatric endoscopic procedures differs from nursing care for adult patients?
1. Differences in the Patient Population
Main question
How does nursing care differ when caring for children undergoing endoscopic procedures compared with adults? Probes
Probes
- How does your nursing care vary according to the child's age or developmental stage? - What considerations are important because of children's physical or psychological characteristics? - How do your approaches to sedation or anesthesia differ for pediatric patients? - How do you support children who are anxious or fearful about the procedure?
2. Nursing Roles and Clinical Judgment
Main question
What aspects of nursing practice require particular attention when caring for children undergoing endoscopy?
Probes
- What do you pay particular attention to when assessing and observing pediatric patients? - Can you describe situations in which nurses need to make important clinical judgments? - Are there situations in which nurses coordinate communication between physicians and families? - What nursing skills do you think are unique to pediatric endoscopy?
3. Nursing Competence
Main question
What competencies do you believe are essential for nurses providing pediatric endoscopy care?
Probes
- Which competencies were particularly important in the situations you described? - How have you developed these competencies? - What experiences have contributed most to your professional growth?
4. Challenges
Main question
What do you find most challenging about pediatric gastrointestinal endoscopy nursing?
Probes
- Are the challenges related to technical aspects, such as equipment or sedation management? - Are they related to providing psychological support for children or their families? - Are they related to communication or coordination within the healthcare team? - In what situations do you encounter these challenges most often? - Can you describe a particularly difficult case? - What nursing judgments or actions were required? - How did you or your team address these challenges?
5. Knowledge and Skills
Main question
What specialized knowledge and skills are required for pediatric gastrointestinal endoscopy nursing?
Probes
- What technical knowledge is particularly important (e.g., equipment, procedures, sedation)? - How important is understanding children's developmental stages? - What observation, assessment, communication, or decision-making skills are required? - How have you acquired and refined this knowledge and these skills? - When teaching novice nurses, what points do you emphasize? - Can you describe a situation in which this knowledge or these skills proved especially valuable? - Besides knowledge and technical skills, are there personal attributes such as insight, sensitivity, or adaptability that you believe are important?
Closing Questions
- Considering everything we have discussed, how would you define nursing competence in pediatric gastrointestinal endoscopy nursing? - How do you believe this competence is developed over time? - How is this competence demonstrated in everyday clinical practice? - Is there anything else you would like to add that we have not discussed?

Thematic saturation was considered to have been reached when no new categories or themes emerged from the additional data and the participants' accounts could be adequately represented within the existing categories and themes.

Throughout the analytical process, researcher triangulation, as described above, was employed to minimize the influence of researchers' preconceptions and enhance the rigor of the interpretation. In addition, three participants reviewed the analytical

results to confirm that the researchers' interpretations accurately reflected their experiences.

Ethical Considerations

This study was approved by the Ethics Review Committee of Yasuda Women's University (Approval No. 240013-Kan-Gaku). Prior to the interviews, participants were informed verbally and in writing about the study purpose and procedures, the voluntary nature of participation, their right to withdraw from the study without

penalty, and the confidentiality of the collected data. Written informed consent was obtained from all participants before the interviews. All data were anonymized, and personal information was handled securely and confidentially.

Results

Overview of study participants

The participants were 12 nurses from two public hospitals and one private hospital. All participants were female. Their nursing experience ranged from 8 to 28 years (median =18 years), while their experience in pediatric endoscopy ranged from 0.5 to 15 years (median = 6.5 years). The mean interview duration was 45.9 minutes (SD = 8.1 minutes).

Nursing competencies perceived by nurses to be necessary for pediatric gastrointestinal endoscopy and treatment

The analysis identified five themes related to the nursing competencies perceived by nurses as necessary for pediatric gastrointestinal endoscopy and treatment.

Ability to anticipate pediatric vulnerabilities and ensure safety

This theme describes nurses' ability to anticipate potential risks during pediatric gastrointestinal endoscopic procedures by considering children's developmental and physiological vulnerabilities and implementing proactive safety measures. Participants emphasized that ensuring safety requires anticipating potential changes before and during procedures, engaging in continuous clinical reasoning and decision-making, and adapting nursing care according to each child's condition.

A key component of this competency was the ability to proactively ensure safety through anticipation. Participants described the importance of preparing for unexpected events by considering the child's age, medical history, and the potential effects of sedation before the procedure begins. As one nurse explained:

"It's best when everything goes smoothly, but predicting how to respond when things don't go as planned—that's really what practical ability is all about. It's about preparing yourself to act based on that prediction and making preparations with foresight."
(15 years of endoscopy experience)

Another important component was integrated observational skills for detecting changes during sedation. Participants emphasized that assessing children's conditions requires integrating multiple sources of information, including physiological monitor data and subtle clinical signs, rather than relying solely on monitoring devices. One nurse reflected on the need for comprehensive assessment during sedation:

"If I suspect that sedation might cause side effects, I tend to monitor more closely or, well, observe using all five senses (omitted)... I think what's required here is the ability to assess the patient's condition more carefully." (6 years of endoscopy experience)

Participants also highlighted the ability to respond promptly to changes in a child's condition and restore safety. This competency involves rapidly recognizing clinical deterioration, determining priorities, and implementing timely interventions to prevent complications. For example, one nurse described the importance of immediate assessment and intervention during upper gastrointestinal endoscopy:

"Throat anesthesia doesn't always work well in children, and since their reflexes can be strong, I watch the movements at the base of their throat to prevent aspiration. Also, (omitted) it is necessary to suction immediately when required." (4 years of endoscopy experience)

Beyond anticipating and responding to clinical risks, nurses emphasized the importance of adapting care to children's developmental and physical characteristics. This competency includes modifying the physical environment and nursing interactions according to the child's body size, developmental stage, and recovery from sedation. Participants described continuously adjusting care to each child's individual responses while preventing injury throughout the peri-procedural period. One nurse stated:

"After sedation, children sometimes become quite agitated, (omitted) so I have to find ways to calm them down. Older children can be quite strong, (omitted) so I feel it's necessary to take precautions to ensure they don't fall." (2 years of endoscopy experience)

Overall, participants described safety in pediatric gastrointestinal endoscopy nursing as a dynamic process involving anticipation, comprehensive observation, timely intervention, and continuous adaptation of care according to each child's condition and developmental characteristics. These competencies enable nurses to minimize risks associated with children's vulnerabilities while maintaining procedural safety.

Ability to promote acceptance of medical procedures by understanding children's cognitive and emotional states

This theme describes nurses' ability to support children in accepting gastrointestinal endoscopic procedures by understanding the cognitive and emotional factors underlying their resistance and advocating for the child throughout the care process. Participants recognized that children's willingness to undergo procedures is shaped by both their level of understanding and their emotional responses. Therefore, they emphasized the importance of comprehensively assessing children's cognitive and emotional states and adapting communication and care accordingly.

A fundamental component of this competency was the ability to identify discrepancies between children's understanding and emotions and to assess their acceptance of the procedure. Participants explained that children's acceptance cannot be determined solely from their verbal responses but must also be assessed through subtle emotional and behavioral cues. Nurses therefore integrated verbal and nonverbal expressions to evaluate each child's level of acceptance. As one nurse stated:

"Even though elementary and middle school students should understand the explanation of why they are undergoing the examination, we are required to assess their state—such as whether they have not yet accepted it—based on signs like a stiff expression." (5 years of endoscopy experience)

This statement illustrates that nurses assessed children's acceptance not only through their expressed understanding but also by interpreting subtle emotional cues and behavioral responses.

Another important component was the ability to facilitate children's understanding of procedures according to their developmental stage. Participants emphasized that explanations should be tailored to each child's cognitive development, using language and communication strategies that the child can readily understand. Rather than providing standardized explanations, nurses adapted their communication to the individual child's developmental level. One nurse explained:

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Participants also highlighted the ability to adjust interactions to promote children's psychological safety. This competency involves modifying the examination environment, interpersonal interactions, and communication approaches according to each child's anxiety and emotional state. Nurses recognized that unfamiliar procedures can threaten children's sense of security and that supportive interactions are essential to reducing anxiety and fostering trust. As one nurse described:

"For a child visiting for the first time, they're in a situation where they have no idea what's going to happen... (omitted) I think it's necessary to make adjustments so they aren't left alone too much, to help them feel at ease." (8 years of endoscopy experience)

Overall, participants described promoting children's acceptance of gastrointestinal endoscopic procedures as a continuous process of assessing cognitive understanding and emotional responses, communicating in developmentally appropriate ways, and creating a psychologically safe environment. Together, these competencies enable nurses to reduce children's anxiety and facilitate their acceptance of medical procedures.

Ability to support parents in accepting and adapting to pediatric endoscopic procedures

This theme describes nurses' ability to support parents in understanding, accepting, and adapting to both current and future pediatric endoscopic procedures. Participants recognized that parents' psychological states influence children's emotional stability and may affect the safe implementation of procedures. Consequently, they emphasized the importance of assessing parents' anxiety, perceptions, and understanding and providing support tailored to their emotional and informational needs.

The first competency identified was the ability to assess parents' anxiety, perceptions, and readiness to accept the procedure. Participants perceived that nurses need to comprehensively understand parents' psychological states by observing their facial expressions, verbal responses, behaviors, and interactions with their children. Such an ability enables nurses to determine the type and extent of emotional and informational support that parents require. As one nurse stated:

"Based on their demeanor in the room, I feel it is necessary to determine whether they are truly experiencing strong fear or anxiety. You know, you wonder, 'Are they afraid of their child undergoing endoscopy?'" (2 years of endoscopy experience)

Once parents' emotional and cognitive needs have been assessed, participants perceived the ability to guide parents toward accepting the current procedure as the next essential competency. They emphasized that nurses should be able to tailor explanations and communication according to parents' level of understanding and emotional responses. Rather than simply providing information, nurses need the ability to alleviate parents' anxiety while fostering confidence before the examination. One nurse explained:

"Since it's not the parent who is undergoing the procedure, they are naturally very worried, so... I think it's essential to interact with them in a way that alleviates their anxiety even before the examination begins." (15 years of endoscopy experience)

Building on parents' acceptance of the current procedure, participants further perceived the ability to support parents in adapting to future endoscopic procedures as an important competency. They recognized that many children require repeated examinations as part of the long-term management of chronic conditions. Therefore, nurses need the ability to help parents view each examination as part of an ongoing treatment process and to foster a more positive and adaptive perspective toward future procedures. As one nurse described:

"Patients with Crohn's disease or UC (ulcerative colitis) have to undergo regular examinations, so I want them to understand and go through with them willingly. This is something that will continue for a long time to come. (omitted) To that end, I think it's necessary to engage with patients—including their families—in a way that helps them view this as a continuous treatment process and accept it positively, while providing ongoing support." (4 years of endoscopy experience)

Overall, participants perceived that supporting parents requires a progression of competencies. Nurses first need the ability to assess parents' emotional and cognitive states, then the ability to facilitate acceptance of the current procedure through tailored communication and emotional support, and finally the ability to help parents develop a positive and adaptive understanding of future examinations. Together, these competencies support parents' acceptance of both current and future pediatric endoscopic procedures.

Ability to promote multidisciplinary collaboration and coordinate the progress of pediatric endoscopic procedures

This theme describes the nursing competencies perceived as necessary to coordinate pediatric gastrointestinal endoscopic procedures through effective multidisciplinary collaboration while responding to children's changing conditions and procedural requirements. Participants recognized that coordinating pediatric endoscopic care is a sequential process that begins with organizing an appropriate support system, continues through maintaining continuity of care by sharing information across settings, and culminates in coordinating procedural progress through collaboration with the multidisciplinary team.

The first competency identified was the ability to reorganize the support system and collaborate according to children's conditions. Participants perceived that nurses need the ability to adjust staffing arrangements and role allocation in response to children's physical movements, physiological changes, and procedural risks. Such an ability enables nurses to flexibly modify the care structure and mobilize support from other team members according to children's immediate needs. As one nurse stated:

"When sedation is insufficient and the child becomes agitated, (omitted) it is necessary to adjust the support system while requesting assistance from other staff members." (10 years of endoscopy experience)

Once an appropriate support system has been established, participants perceived the ability to maintain consistent nursing care through information sharing across pre- and post-procedure settings as another essential competency. They recognized that pediatric endoscopic care involves multiple nurses and departments and therefore requires the integration and sharing of information regarding children's physical, psychological, and social conditions. Such an ability enables nurses to maintain continuity of care across outpatient clinics, inpatient wards, and endoscopy units. One nurse explained:

"I think information sharing with the pediatric outpatient clinic and the ward is key to grasping the situation quickly. Um... continuity of care. I believe we need the ability to understand information covering physical symptoms, (omitted) psychological aspects, and social factors as well." (4 years of endoscopy experience)

Building on an organized support system and effective information sharing, participants further perceived the ability to coordinate procedural progress through multidisciplinary collaboration as an essential competency. This ability refers to nurses' capacity to assess children's distress, physical burden, and physiological changes throughout the procedure and to communicate these findings to physicians and other healthcare professionals so that appropriate adjustments can be made. Participants recognized that coordinating pediatric endoscopic procedures requires continuous communication and collaborative decision-making in response to children's changing conditions. As one nurse described:

"It becomes necessary to adjust the progress of the examination while considering the child's burden and the effects of sedation (omitted) and liaising with the physician." (8 years of endoscopy experience)

Overall, participants perceived multidisciplinary collaboration as a progressive competency. Nurses first need the ability to organize an appropriate support system, then the ability to maintain continuity of care through comprehensive information sharing, and finally the ability to coordinate procedural progress collaboratively according to children's changing conditions. Together, these competencies support the safe and effective delivery of pediatric gastrointestinal endoscopic care.

Reflective and developmental abilities required to maintain and enhance pediatric gastrointestinal endoscopy nursing practice

This theme describes nurses' ability to develop and refine pediatric gastrointestinal endoscopy nursing practice through reflection on clinical experiences, acquisition of specialized knowledge, and continuous professional development. Nurses emphasized the importance of deepening their understanding of children's unique physiological characteristics and their risk of sudden deterioration while applying knowledge and skills gained through experience and self-directed learning to clinical practice.

One subcomponent of this competency is the ability to maintain safe practice through standardized knowledge and skills. This

foundational competency enables nurses to provide safe and consistent care by utilizing established procedures, clinical guidelines, and educational resources. As one nurse explained:

"Because education pathways and (omitted) allow even newly transferred staff to perform procedures while referring to manuals, it is essential to be able to practice based on standardized procedures." (2 years of endoscopy experience)

Participants also emphasized the ability to develop experiential knowledge by reflecting on previous clinical encounters and applying these insights to subsequent care. Reflection on clinical experiences was perceived as an important process for improving interactions with children and strengthening practical competence.

"When I was not yet accustomed to working with pediatric patients, (omitted), I was worried that my nervousness might be conveyed to them, but as I gained more experience, I felt I was able to adjust my approach, and I think it is important to apply these experiences to future interactions." (2 years of endoscopy experience)

In addition to learning through clinical experience, participants underscored the importance of incorporating new knowledge and techniques acquired through academic activities and continuing professional education into clinical practice. Exposure to new evidence enabled nurses to continually reassess and refine their care approaches. Accordingly, the ability to integrate emerging knowledge into practice was regarded as an essential competency for maintaining high-quality pediatric gastrointestinal endoscopy nursing. Participants emphasized that sustained professional competence requires ongoing learning, knowledge sharing, and continuous adaptation of clinical practice in response to advances in evidence and care. One nurse described:

"I attend academic conferences, absorb new information, and share it with everyone when I return. Our methods change as a result, but I believe it's necessary to keep making these changes." (8 years of endoscopy experience)

Overall, nurses described competency in pediatric gastrointestinal endoscopy nursing as a dynamic and continuously evolving process that integrates standardized knowledge, experiential learning, and emerging evidence. They emphasized reflective practice and lifelong professional development as essential for maintaining and advancing specialized nursing practice.

Summary of the pediatric gastrointestinal endoscopy nursing competencies

Across the five themes identified in this study, competencies in pediatric gastrointestinal endoscopy nursing encompassed the ability to anticipate and manage children's vulnerabilities to ensure safety, support children and their parents in adapting to procedures, coordinate care through multidisciplinary collaboration, and continuously maintain and enhance practice through reflection, ongoing learning, and the integration of new knowledge.

Discussion

Nursing competencies required for nurses providing pediatric gastrointestinal endoscopy and treatment

This study is distinctive in that it conceptualized nursing competencies required for pediatric gastrointestinal endoscopy and

treatment based on the practical experiences and tacit knowledge of nurses directly involved in this field. These competencies do not exist in isolation but are interrelated, with the ability to anticipate children's vulnerabilities and ensure their safety serving as the foundation for nursing competencies in pediatric gastrointestinal endoscopy and treatment (Figure 1). The following discussion focuses on the five themes identified in this study.

Ability to anticipate pediatric vulnerabilities and ensure safety

The findings suggest that participants perceive safety not merely as a response to adverse events after they occur, but as a proactive process developed through anticipation and preparation for potential risks. In adult gastrointestinal endoscopy nursing, nurses are expected to anticipate procedural processes, collect and assess patient information within limited timeframes, and collaborate with physicians to identify and manage risks [15, 16]. However, pediatric gastrointestinal endoscopy nursing requires these competencies to be applied in the context of children's developmental and physiological vulnerabilities. Participants described the importance of preparing for potential risks, including respiratory depression, involuntary movements, and sudden changes in condition, while considering each child's developmental stage and physiological characteristics. They also emphasized the need to detect subtle changes during procedures, integrate information from multiple sources, and determine appropriate responses based on the child's condition. This may be particularly important in pediatric care because children may have limited ability to recognize or verbalize discomfort and distress [17]. Given the risks associated with sedation management in children [2, 18], ensuring safety requires nurses to continuously engage in a dynamic process of anticipating potential problems, observing children's conditions, making clinical judgments, and adjusting care strategies. Thus, the ability to anticipate vulnerabilities and respond flexibly may represent a core competency of pediatric gastrointestinal endoscopy nursing.

Ability to promote acceptance of medical procedures by understanding children's cognitive and emotional states

The findings indicate that participants viewed children's acceptance of procedures as encompassing both cognitive understanding and emotional readiness. Children's comprehension of procedures varies according to their developmental stage, while anxiety and fear are experienced regardless of age [19, 20]. These emotions can substantially affect children's willingness to undergo and cooperate with procedures [21]. Previous research has suggested that children undergoing medical procedures may experience conflict between a desire to avoid the procedure and an understanding that it is necessary, with their responses gradually changing as they move toward acceptance [22]. Therefore, nurses should carefully assess children's psychological and emotional readiness and provide opportunities for them to express their concerns and internal conflicts.

To help children overcome these challenges and prepare for procedures, participants emphasized the importance of tailoring explanations, communication styles, and interactions to each child's developmental level and emotional state. Consistent with this finding, cartoons and visual illustrations used to explain endoscopic procedures in a developmentally appropriate manner have been shown to reduce children's anxiety [23, 24]. However, this competency extends beyond simply providing information; rather, it requires reciprocal interactions in which children's verbal and nonverbal responses continuously guide the nurse's approach. Musselman et al. [25] similarly emphasized that developmentally appropriate interactions foster trust between nurses and children, thereby promoting cooperation with medical procedures. Accordingly, the findings of this study, alongside prior research, suggest that pediatric gastrointestinal endoscopy nurses are continually called upon to understand children's developmental and emotional needs to flexibly tailor their communication and support in response to each child's unique reactions.

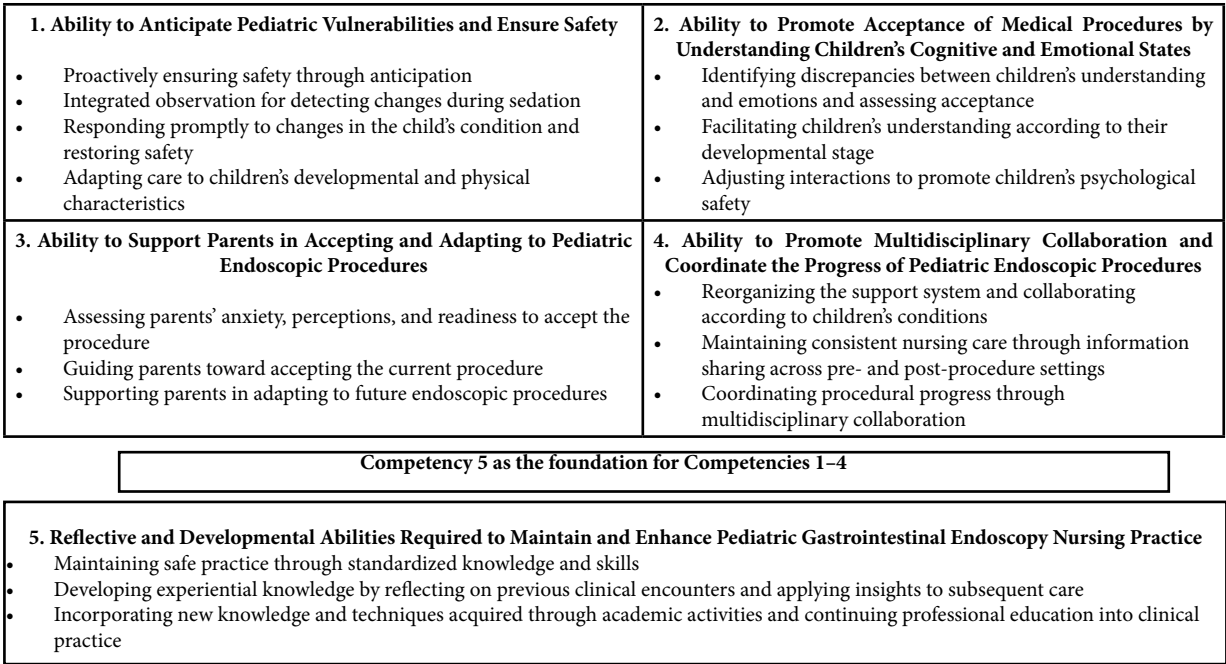


Figure 1: The components of nursing competencies perceived by nurses to be necessary for providing care during pediatric gastrointestinal endoscopic examinations and treatments.

Overall, supporting children's acceptance of pediatric gastrointestinal endoscopy requires nurses to integrate assessments of children's cognitive understanding and emotional readiness and to provide individualized support that bridges these interconnected aspects of their procedural experiences. This support must often be delivered within limited timeframes, such as immediately before procedures or while children are awaiting them.

Ability to support parents in accepting and adapting to pediatric endoscopic procedures

Children's experiences during medical procedures are closely associated with their parents' psychological states. In pediatric healthcare, parents play an important role in supporting their children, and previous studies have suggested that parental psychological states and involvement can influence children's responses and adaptation to medical experiences [26,27]. Therefore, supporting parents is an important component of promoting children's acceptance of medical procedures.

The findings indicate that nurses need to assess parents' anxiety and level of understanding regarding procedures and provide support that addresses both informational and emotional needs. Participants also emphasized the importance of promoting parents' emotional stability, which may indirectly contribute to children's emotional regulation and behavioral responses. This suggests that nurses recognize parents not only as recipients of information but also as individuals who are closely connected with and influence their children's experiences.

A notable competency identified in this study appeared to be nurses' ability to help parents construct positive meanings from their child's examination experiences. Previous studies have similarly suggested that parents' positive perceptions of medical procedures enhance treatment adherence and improve treatment outcomes [28]. By helping parents reframe procedures as meaningful steps in their child's treatment rather than solely distressing events, nurses may foster more adaptive attitudes toward care. Importantly, this competency extends beyond supporting acceptance of a single procedure; it involves helping parents develop constructive perspectives on the repeated examinations and treatments that may be required throughout their child's healthcare journey.

Ability to promote multidisciplinary collaboration and coordinate the progress of pediatric endoscopic procedures

The progression of pediatric gastrointestinal endoscopic procedures is not determined by the judgment of an individual nurse alone; rather, it is continuously adjusted through collaboration among multidisciplinary team members according to changes in the child's condition. In pediatric healthcare, where care often requires consideration of both medical and psychosocial factors, the importance of multidisciplinary approaches has been widely emphasized [29,30].

The competency identified in this study extends beyond simple role allocation and teamwork. Nurses described the need to detect changes in children's physical movements, responses to sedation, and levels of risk and to flexibly adjust staffing arrangements, role assignments, and procedural progression according to these changes. Furthermore, nurses emphasized the importance of integrating and sharing information across outpatient clinics, wards, and endoscopy units to establish a shared understanding among team. Such coordination

enhances continuity of care, thereby improving patient safety, fostering trust, and supporting effective treatment [31]. In addition, nurses played an important role in coordinating clinical decisions among healthcare professionals by communicating children's distress, physical changes, and procedural burden and by supporting adjustments to the procedure when necessary. A recent systematic review similarly identified nurses as key members of multidisciplinary teams who facilitate information exchange, advocate for patients and their families, and contribute to collaborative decision-making, ultimately improving patient outcomes [32].

These findings suggest that coordinating pediatric gastrointestinal endoscopy requires more than effective teamwork; it involves continuously integrating assessment, coordination, and communication throughout the procedure. Specifically, nurses must recognize changes in children's conditions, reorganize team support in response to evolving clinical needs, and facilitate timely information sharing and collaborative decision-making within the multidisciplinary team. These dynamic coordination competencies appear crucial to ensuring patient safety, maintaining continuity of care, and promoting children's well-being.

Reflective and developmental abilities required to maintain and enhance pediatric gastrointestinal endoscopy nursing practice

Nursing competence in pediatric gastrointestinal endoscopy is developed and sustained not only through formal education, such as training programs and professional activities, but also through the accumulation and refinement of experiential knowledge gained through clinical reflection. According to experiential learning theory, individuals deepen their learning through a cyclical process involving concrete experiences, reflective observation, conceptualization, and application of newly developed insights to practice [33]. The findings of this study reflect this process of continuous competency development.

Because children's physiological systems are still developing, their responses to procedures and sedation may differ considerably from those of adults and may change rapidly [18]. Therefore, pediatric nursing requires nurses to anticipate potential risks associated with developmental characteristics and to apply assessment and decision-making approaches that differ from those commonly used in adult care. Participants indicated that clinical situations cannot always be managed through previously acquired knowledge or routine procedures alone, highlighting the importance of developing pediatric-specific clinical judgment based on specialized knowledge and experience.

Although standardized procedures and guidelines provide an important foundation for safe practice, pediatric gastrointestinal endoscopy may involve unexpected events, such as sudden movements or agitation in children, as well as adverse events such as perforation, bleeding, and sedation-related respiratory depression [34]. These situations require nurses to provide individualized responses based on their clinical judgment. In such contexts, nurses need to reflect on clinical experiences, reinterpret their knowledge, and adapt their practices to provide appropriate care. Furthermore, participants described applying updated knowledge obtained through academic conferences and professional learning activities to clinical practice and sharing this knowledge with colleagues. Such activities represent a process through which individual learning is transformed into

collective knowledge and contributes to the improvement of nursing practice within the organization. Thus, the competency identified in this study extends beyond individual professional development. It involves the ability to continuously enhance pediatric gastrointestinal endoscopy nursing practice at both individual and organizational levels by integrating specialized knowledge, experiential learning, reflective practice, and knowledge sharing.

Clinical and Educational Implications

The findings of this study have the potential to inform nursing practice and education. In clinical practice, the competency framework identified in this study may serve as a practice guideline for maintaining the quality of nursing care throughout the pre-, intra-, and post-procedural phases. Before the procedure, for example, the framework highlights the importance of considering children's developmental stages, physical characteristics, and sedation-related risks to ensure their safety. It also guides nurses in assessing the emotional states and understanding of children and their parents to promote their acceptance of treatments and/or procedures. During the procedure, the framework emphasizes the importance of recognizing subtle changes in the child's condition and facilitating timely information sharing and coordination among healthcare professionals to support the smooth progression of treatments and/or procedures. After the procedure, the framework can facilitate nurses' reflection on their clinical experiences, enabling them to apply lessons learned to subsequent care.

The competencies identified in this study may also inform the educational content and approaches needed to develop these competencies. For example, simulation-based training that incorporates anticipating and responding to sedation-related respiratory changes or unexpected body movements may help improve the "ability to anticipate pediatric vulnerabilities and ensure safety." Similarly, to develop the "ability to promote acceptance of medical procedures by understanding children's cognitive and emotional states," case-based learning or role-play involving children at different developmental stages may help nurses recognize verbal and nonverbal responses and adapt their explanations and interactions accordingly. However, because the competencies identified in this study remain relatively abstract, further clarification of the specific knowledge, skills, and behaviors underlying each competency is needed. Such refinement may facilitate the translation of these competencies into structured, stepwise educational programs.

Limitations and Future Challenges

This study has several limitations. First, because participants were recruited from nurses involved in pediatric gastrointestinal endoscopy and treatment at only three institutions in Japan, the transferability of the findings to other settings may be limited. Second, this study focused exclusively on nurses' perspectives and did not include the experiences of children or their parents. Consequently, it did not capture the views of other key stakeholders involved in pediatric gastrointestinal endoscopic care. Third, the competencies identified in this study are presented at a relatively high level of abstraction. Therefore, the specific knowledge, skills, and attitudes required for pediatric gastrointestinal endoscopy remain to be clearly defined.

Future research should include a broader range of participants and incorporate the perspectives of children and their parents to further develop and refine a comprehensive framework of nursing

competencies for pediatric gastrointestinal endoscopy. In addition, the specific knowledge, skills, and behaviors required to care for children undergoing pediatric gastrointestinal endoscopic examinations and treatments should be identified through expert consensus, such as a Delphi study. Defining these competencies in greater detail would provide a stronger foundation for nursing education, competency assessment, and clinical practice in pediatric gastrointestinal endoscopy nursing.

Conclusion

This study identified five interrelated competencies that characterize pediatric gastrointestinal endoscopy nursing practice, with consideration of children's developmental and physiological vulnerabilities. Among these, the ability to anticipate children's vulnerabilities and ensure safety appears to serve as the foundation for nursing competencies in pediatric gastrointestinal endoscopy and treatment. However, pediatric gastrointestinal endoscopy nursing extends beyond safety management alone. It involves the integrated application of multiple competencies, including supporting children and parents in adapting to procedures, coordinating procedural care through multidisciplinary collaboration, and continuously developing practice through reflection and learning. Therefore, the nursing competencies required in pediatric gastrointestinal endoscopy and treatment can be understood as integrated practical competencies in which multiple abilities are interconnected and exercised, with the recognition and management of children's vulnerabilities forming the underlying foundation.

Conflict of Interest

The authors declare that they have no competing interests.

Author's Contributions

All authors made substantial contributions to the conception and design, or acquisition of data, or analysis and interpretation of data; were involved in drafting the manuscript or revising it critically on important intellectual contents; and gave final approval of the version to be published.

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