Published in final edited form as:

Intensive Crit Care Nurs. 2018 June ; 46: 70–79. doi:10.1016/j.iccn.2018.02.006.

“Keeping pace according to the child” during procedures in the paediatric intensive care unit: a grounded theory study

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Abstract

Objective—The goal was to explore how nurses interact with children in the paediatric intensive care unit during potentially painful procedures.

Research Methodology/Design—This was a qualitative research study that used grounded theory. Data were collected through participant observation and interviews. Nurse–child interactions were observed and recorded during potentially painful procedures performed by nurses. Following observation of a procedure, nurses were interviewed about their intentions, feelings, and emotions during the procedure.

Setting—The study took place in a seven-bed paediatric intensive care unit in an academic teaching hospital in Japan.

Findings—Children’s acceptance of a procedure was induced by nurses’ pacing, particularly in a pattern of “keeping pace according to the child.” Such pacing involved soothing the child, explaining what was being done to the child at each step, and acknowledging the child’s emotions. All of these child-centred procedures provoked cooperation from the children even during painful procedures.

Conclusions—Our study suggests that a collaborative practice approach, in which nurses use a series of calming tactics, might improve children’s perceptions of painful procedures.

Keywords

child; grounded theory; interactions; painful procedures; paediatric intensive care; qualitative research

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DECLARATION OF INTEREST

Conflicts of interest: none.

INTRODUCTION

Critically ill children admitted to the paediatric intensive care unit (PICU) may experience painful procedures which lead to traumatic experiences (Ward-Begnoche, 2007; Carnevale and Gaudreault, 2013). Moreover, the effects of traumatic experiences can persist following a child's discharge, resulting in mental health complications such as post-traumatic stress disorder (Nelson and Gold, 2012). Children who have been admitted to a PICU are likely to report that their subsequent quality of life is lower than before admission and when compared with normative paediatric populations (Buysee et al., 2008; Knoestr et al., 2008; Colville and Pierce, 2013).

In response, many recent studies have focused on the manner in which painful procedures are administered in the PICU. Most of these studies discuss a single aspect of care provision, such as how to reduce pain (Koller and Goldman, 2012; Lee et al., 2015) or how to use sedatives or analgesics effectively (Czarnecki et al., 2011; Staveski et al., 2014). In real life, however, nurses are expected to gather information relevant to both their patients and the surroundings in order to provide a multifaceted approach to care that adapts to each situation (Tanner, 2006; Simons, 2010). We have found no previous studies that used a more holistic and broad perspective on mitigating pain during PICU procedures. More information on the interactions between nurses and children during painful procedures is still needed.

During admission to the PICU, a child may be in an unstable condition, and sedative medication is often administered (Crawford and Dixon, 2012). Many intensive care procedures are invasive and painful. Daily care in the PICU, such as positioning and bed bathing, can also generate pain (Baptiste, 2007). Nurses are responsible for many of these intensive and daily care procedures, and it is thus important to explore how nurses themselves perform such procedures. Therefore, this study aimed to explore how nurses in a PICU interact with their child patients during potentially painful procedures.

METHODS

Aim

To explore how nurses interact with children during potentially painful procedures in the PICU.

Setting

This study was conducted in the general PICU of an academic teaching hospital in Japan. The PICU had seven beds and admitted children up to 15 years of age. The staffing ratio was one nurse to two patients, and nurses were required to have at least one year of nursing experience before working in this PICU.

Ethical Approval

This study, part of a larger research study of JSPS KAKENHI [grant number. 15H05089; Program PI. Shigeko Saiki-Craighill], was considered high risk due to the vulnerability of the participants. Therefore, we obtained support from the nursing and medical managers of the hospital, together with full ethical approval from the institutional review board of the

authors' university (2014–12) and the participants' hospital (2014–0483). Written informed consent was obtained from the nurses and from the parents of the child.

Participants

A purposive sample of children admitted to the PICU were enrolled. Children who were expected to die within one week of admission were excluded. A nursing manager assessed the potential child participants and then explained the study to the children's parents. If the parents were interested in having their child participate, the principal investigator (PI) contacted the parents directly to obtain a signed written consent form for participation. In addition, the PI informed all the nurses in the PICU about the study and obtained signed written consent from about two-thirds of the nurses before the study began. One-third of the nurses declined to be involved, but agreed to collect data in situations where they themselves were not included in the observations. Data were collected only in situations where both the child's parents and the nurses separately had provided prior permission.

The PI observed seven procedures consisting of six children involved in procedures that were expected to possibly cause pain for the child because of the level of invasiveness. The children's ages ranged from three years to five years, and there were three boys and three girls. Only one child was intubated. All of the children received sedatives and analgesics. The children's diagnoses were atrial septal defect, fulminant myocarditis, neuroblastoma, and craniosynostosis including the duplication. The procedures involved eight registered nurses in the PICU, all of whom had worked at that PICU from several months to 20 years. All participants were anonymised, using the abbreviations Child A (through Child F) and RN1 (through RN8).

Data Collection

Data were collected by the PI via participant observations and unstructured interviews. Participant observation was selected as the main method for this study as it allowed the PI to observe interactions between nurses and the children they were caring for during painful procedures. The painful procedures observed included evulsion of the central venous catheter, aspiration, and bed bathing. For each procedure, the interactions between the nurses and the child were recorded as field notes from an observer's viewpoint; if permission had been obtained, the interactions were also audiotaped. After each participant observation, the PI conducted additional unstructured interviews with the nurses to assess their feelings and emotions during the interactions. Interviews with the nurses were also used to confirm the PI's interpretations and the accuracy of the written descriptions.

Grounded theory calls for saturation to determine a sample size, and theoretical sampling was used to help identify the next purposive set of children and procedures (Strauss & Corbin, 1998). Saturation was judged by richness and interpretability, and these were ascertained by constant comparison. Some similar data from the larger research project were used to complement our constant comparison.

Data Analysis

Data analysis was performed via Strauss and Corbin's grounded theory (1998). Grounded theory provides a method for defining a phenomenon as a flow of processes resulting from the interrelationship of meanings (symbols) that are generated from actors' perceptions, actions, and interactions with subjects (Strauss & Corbin, 1998; Corbin, 2013). Grounded theory is underpinned by symbolic interactionism (Glaser & Strauss, 2006), which holds an underlying assumption that social changes are constructed by social interactions and processes. In addition, awareness of structure (conditions), process (actions/interactions), and consequences (changes), which is called as a paradigm, are thought of as key factors for understanding actor viewpoint and behavioural patterns (Strauss & Corbin, 1998; Corbin, 2013).

This study used grounded theory to explore how nurses interact with children during potentially painful procedures in the PICU. The steps for analysis based on grounded theory include the following: create texts through field notes and recordings; read the texts carefully; sectionalize the descriptions based on the meaning of the content; extract the lowest-abstracted concepts; provide properties and dimensions, where properties define unique characteristics of concepts, and dimensions are positions that can be placed in regard to corresponding properties (dimensions are determined by comparisons); name each section using properties and dimensions (labelling); organize labels into categories using comparisons; and characterize categories by properties and dimensions (Strauss & Corbin, 1998).

Following these preliminary steps, a paradigm defined as structure composed by a set of conditions, actions/interactions, and consequences is used to explore a phenomenon's structure. Then categories' relationships are determined by properties and dimensions to explore the flow of a process. Additionally, diagrams are created for each sample to determine the next data sample through theoretical sampling. Once this process has been repeated several times, synthesized diagrams for each phenomenon, based on the categories, properties, and dimensions, are created. Then, by using comparison among cases, repeatedly emerged patterns are identified (Strauss, & Corbin, 1998; Corbin, 2013).

The trustworthiness of the analysis was ensured by involving two additional researchers who independently reviewed the conclusions made by the PI. In addition, the methodology was discussed in a grounded theory seminar, which was organized as a graduate course at the PI's institution. Finally, our findings were discussed with a research group until a consensus was reached.

FINDINGS

The PI observed interactions between nurses and children that lasted between 5 and 30 minutes (mean, 20 minutes). The subsequent interviews with nurses lasted between 5 and 10 minutes. Through analysis of the participant observation and interview data, a phenomenon was identified and named "Considering how to proceed with the procedure". This name is also the title of the central category within this phenomenon: grounded theory states that a central category should exist that represents and explains the whole of a phenomenon. As

such, a phenomenon should have the same name as its central category (Strauss, & Corbin, 1998). The phenomenon “Considering how to proceed with the procedure” is based on 13 categories that emerged from an analysis of the data. Each category is described below.

1) Category Descriptions

There are 13 categories in the phenomenon “Considering how to proceed with the procedure”. The text in italics, below, represents quotations from participant observations and interviews, which have been translated from Japanese into English by the PI. Table 1 shows the definitions, and corresponding properties and dimensions, for six child-related categories, and Table 2 shows the definition, properties, and dimensions for seven nurse-related categories.

1.1) Considering how to proceed with the procedure—This is the central category of the phenomenon because this category has an important function as the nurses’ actions were dictated by the outcome: they moved to either “keeping pace according to the child” or “keeping pace according to the nurse”. “Considering how to proceed with the procedure” involves a nurse’s judgement on procedural pacing and priority, while accounting for the degree of invasiveness of the procedure, the urgency of the need for the procedure, and the degree of endurance of the child.

Interview, RN6: “I think ... considering Child E’s condition, it would be beneficial for him to know that he can make it through the procedure. I thought that he could perform positioning if I provided support. I also think that positioning is not as invasive and does not need to be completed quickly, hence, I thought I should provide a thorough explanation to encourage him so that he could do it. In addition, if he performs the procedure actively, it could reduce the procedural pain, as compared to if I performed the procedure for him. Therefore, I tried to match his pace.”

In the PICU, severely ill children suffer from pain, even with minimally invasive care and procedures. However, it is sometimes essential to perform more invasive procedures to treat a condition. Experienced nurses consider how to proceed with a procedure not only by assessing the treatment priority, but also by accounting for the child’s status based on experience with previous nurse–child interactions.

1.2) Calmness of the child—Most of the nurses assessed the degree of calmness of the child, based on the child’s appearance.

Field notes, Child C: RN3 and RN4 were attempting transtracheal aspiration. Child C’s brow was slightly lower, his cheeks were slightly raised, his mouth started to wriggle slowly, and his hands repeatedly opened and closed. Although the RNs talked to him, he did not respond, but only repeated these movements. RN4 stated that “He seems to be calm, but may wake up easily, considering his movement.”

Children in the PICU sometimes receive sedatives during treatment, and this can make it difficult to assess their calmness. The participating nurses used a validated scale to assess a

child's calmness, pain, or comfort. However, in addition to this scale, experienced nurses tried to understand the calmness of the child through observations and interactions.

1.3) Checking the understanding of the child—This category describes an action in which nurses ask the child to confirm their responses. The goal is to estimate whether the child is able to understand.

Field notes, Child E: Child E was undergoing pericardial drainage for fulminant myocarditis, and any body movements led to pain. While bed bathing, RN6 waited for Child E to stop crying and then explained the procedure slowly. RN6 then asked, "Child E, can I help you roll around? I think you can make it." RN6 kept looking at Child E's eyes until he responded. Thus, by questioning and observation, RN1 appeared to check Child E's understanding.

Although some children in the PICU receive sedatives, nurses always attempt to check the child's understanding of the procedure. The child's perceived understanding then affects the way the nurses perform the procedure.

1.4) Soothing the child—This is an approach used by nurses to calm a child. It involves various methods such as talking to the child in line with the child's responses, adopting an empathic or warm-hearted attitude, and/or using analgesics properly.

Field notes, Child C: Before starting transtracheal aspiration, Child C had a grimace on his face and wriggled slightly. Then RN3 administered additional sedatives, touched the child's head, and said, "I'm sorry, but this needs to be done to you". Thereafter, RN3 said to the researcher, "His sedation baseline was a little lower than the goal; then, I thought it would be beneficial for him to be soothed by an extra dose of midazolam, because aspiration is so hard and painful."

In situations where a child is expected to experience suffering due to procedural pain, the nurses soothed the child behaviourally and pharmacologically before and/or during the procedure. In the PICU, nurses were allowed to increase sedatives and provide extra analgesics within physicians' directions. However, the nurses also continued soothing behaviourally even after providing pharmacological soothing.

1.5) Keeping pace according to the child—The category "keeping pace according to the child" implies that the nurses match their pace to the child's pace, while encouraging the child to believe that they can make it through the procedure. The nurses consider the child's comfort using methods such as understanding the child's pain threshold, observing the child carefully, and/or encouraging the child to continue.

Field notes, Child E: RN6 and RN8 were bathing Child E in bed. Child E had undergone pacemaker insertion on the previous day. They carefully monitored the child's facial expression and body movements. When Child E said "Ouch!", "Please, stop it", "I do not want to do this", or "I cannot do that", they would stop bed bathing and ask Child E: "Does it hurt you?" or "Can I do it again?" Then they performed again according to Child E's pace, paying attention to the child's pace

and trying to match it. In addition, they talked to him repeatedly, and said, “You can complete it!” to encourage him to continue.

To manage pain and discomfort, the PICU nurses paid attention to each child’s response and attempted to understand it. They then tried to match their pace to the child’s pace, while encouraging the child and/or considering the child’s comfort. The child would then exhibit acceptance or endurance for the procedure.

1.6) Keeping pace according to the nurse—This category indicates that nurses followed their own pace through the procedure, rather than the child’s pace. For example, a nurse might believe it would be beneficial for the child to complete the procedure quickly, as long as the nurse’s pace was appropriate and suitable for the child. The goal of “keeping pace according to the nurse” is to perform the procedure efficiently in order to minimize the child’s pain overall.

Field notes, Child C: RN3 started transtracheal aspiration. When starting aspiration, Child C’s face reddened and the child grimaced, suggesting that he felt pain. Nevertheless, RN3 did not stop the aspiration, and moved the catheter slowly (felt like 5 seconds). And aspiration was done at only one time, therefore, RN3 probably intended to finish the aspiration in the minimum amount of time. After observation, RN3 mentioned, “I think it is good for the child to finish aspiration quickly and at one time, because, you know, aspiration is necessary but painful. Therefore, it should be done quickly, with the smallest invasion.”

In the PICU, children’s conditions are often severe and painful. Some children in the PICU undergo more procedures than others. It is sometimes necessary to follow the nurse’s pace, particularly in urgent and/or invasive situations. Moreover, in these situations, following the child’s pacing might lead to resistance, thus making it more difficult for the nurse to concentrate on the procedure.

1.7) Acceptance by the child—This category indicates that the child accepted the procedure, which could then be performed smoothly.

Field notes, Child B: Child B had had a slight dose of sedative medication because extubation was performed just before. When RN1 said “Child B, I would like to get rid of your sputum from your mouth, so will you open your mouth?” to Child B and patted her lips, Child B did not say anything, but looked into RN1’s eye, blinked at a constant rhythm, and opened her mouth slowly. Hence, it is likely that she understood what RN1 said, and accepted the aspiration.

When children in the PICU are administered sedatives, their displays of acceptance are sometimes unclear. However, experienced nurses judge acceptance in a child based not only on language, but also on behaviour and gestures.

1.8) Resistance by the child—This category indicates that the child resisted the procedure. Some children exhibit resistance clearly. However, children who are receiving sedatives or are intubated may have difficulty exhibiting resistance as follows.

Field notes, Child C: During transtracheal aspiration, Child C did not move and did not say anything due to intubation. Moreover, the monitors above the bed did not indicate any significant changes. However, a teardrop rolled down from Child C's right eye. RN3 and RN4 both said, "We are sorry, Child C. It might be bad, and you might feel unpleasant. You may want to say 'No'." RN3 and RN4 did interpret the teardrop as the child's resistance.

Also, experienced nurses judge resistance in a child not only from the child's actions or from biological monitors (such as monitors of heart rate or oxygen saturation), but also by slight responses, such as the single teardrop rolling down from Child C's eye.

1.9) On-the-scene comments about the procedure—Nurses often provide comments that can be understood by the child and that explain what the nurses will do or what they are doing in clear, concise, and encouraging language.

Field notes, Child E: When attempting to change [the child's] position during a bed bath, RN6 explained to Child E, "I will help you to lift your hip, so you also do your best to lift your hip. During this, RN8 will change your old diaper to a new one. It will just take 10 seconds! You can count it, and let's do this together, all right?" RN6 talked to Child E slowly, clearly, and concisely. He also looked at Child E, and showed counting down from 10 with his fingers.

In this study, some of the PICU nurses, as a matter of course, explained the procedural process to the child and attempted to receive assent from the child using methods that accounted for the child's degree of consciousness and understanding. These nurses used several methods, such as clear and concise language, repetition, and behaviours like gestures and touching.

1.10) Concentration on the procedure—The category of "concentration on the procedure" indicates that the nurses performed the procedure using appropriate techniques with a minimum of invasiveness, short duration, and minimal need for restraining the child.

Field notes, Child C: After aspiration, RN4 started to assist respiration by using the Jackson Rees technique quickly and smoothly. RN4 alternately watched Child C's facial expression, chest movement, and monitors. Her hands were just placed on Child C's chest, not pressing down. RN4's facial expression looked grave and she did not say anything for a moment, which looked like concentration. Child C's chest moved without resistance and in the rhythm of RN4's pumping. As RN4 pumped, Child C seemed to calm.

When nurses concentrate appropriately on a procedure, children are often able to continue and to succeed in undergoing the procedure. Therefore, accuracy in the nurses' technique is very important.

1.11) Cooperation from the child—This category indicates a child's cooperation with the nurses, even while receiving a potentially painful procedure.

Field notes, Child B: Child B kept opening her mouth about 1 inch when RN1 was performing oral aspiration. Her eyelids tightened, brow became lower, and she

clenched her fists tightly; however, she kept opening her mouth and did not close it. RN1 did not assist or hold Child B's mouth. So, it appeared that Child B tried to cooperate with the nurse for the procedure.

Within the PICU setting, some children's levels of consciousness and understanding are not clear. However, the children seemed to actively overcome their resistance or fear when the procedures were performed appropriately by the nurses according to the previous nurse-child interactions.

1.12) Ability to continue undergoing the procedure—Some children demonstrated the ability to undergo the procedure, but their attitude was passive or reluctant as compared to the active “cooperation from the child” examples.

Field notes, Child C: RN3 started transtracheal aspiration, but Child C's face reddened and he grimaced; however, he did not make any large movements, except for the repeated opening and closing of the hands. Conducting aspiration and assisting with it by RN3 and RN4 seemed skilful, and they acted cooperatively. Child C became agitated once, but he calmed immediately.

It is sometimes necessary to perform painful procedures, even when a child exhibits resistance. However, when nurses perform the painful procedures adequately, children are often able to continue receiving the procedure.

1.13) Difficulty undergoing the procedure—Sometimes a child seems to be completely resisting a procedure (for example, by struggling or a pained expression), to the extent that the nurses are forced to postpone the procedure.

Field notes, Child D: When RN5 attempted to perform bed bathing for Child D, Child D brushed her hands away, started to wave his arms strongly, and shouted out. RN5 could not approach him and could not do anything.

During this study, difficulty undergoing the procedure was the most unsatisfactory consequence.

2) Pattern Descriptions

When comparing the process flows in each observed procedure, two primary patterns were noted: a child-centred care provision pattern and a nurse-centred care provision pattern. These patterns did not represent the attributes of the nurses, but instead depended on the specific circumstances of each procedure. Experienced nurses judged and chose one of these two patterns as the best way to provide care during a procedure.

Figure 1 shows the process flow for the child-centred care provision pattern, and Figure 2 shows the process flow for the nurse-centred care provision pattern. Each box indicates a category, together with associated properties and dimensions. (See Table 1 for child-related categories, properties, and dimensions, and Table 2 for nurse-related categories, properties, and dimensions.) In the figures, arrows between boxes show how the categories relate to one another via specific properties and dimensions. Lowercase letters in the discussion below correspond to those same letters in Figure 1, Figure 2, Table 1, and Table 2. The processes

observed via nurse–child interactions during seven potentially painful procedures, and illustrated in Figure 1 and Figure 2, were cyclic and repeated until the procedure was completed.

2.1) Child-centred care provision pattern (Figure 1)—The “child-centred care provision pattern” was named for the way nurses resourcefully matched their procedural pace to each child and procedure by considering the child’s condition and responses. In this pattern, nurses performed potentially painful procedures as follows:

First, the nurses monitored the calmness of the child. When a child was very calm, the child appeared expressionless or otherwise relaxed (letter a, in Figure 1), and this allowed the nurses to then check the child’s understanding of the procedure. If a child was not calm, the child would fidget, struggle, or cough (b), and the nurses would need to soothe them. If the nurses’ soothing methods (including talking to the child in line with their response, or appropriately using analgesics or sedatives) were sufficient (c), then the nurses could check the understanding of the child.

When the nurses found that the child’s understanding was sufficiently high (d), the nurses could then consider how to proceed with the procedure. In cases where the nurses had adequately considered how to proceed, the degree of procedural invasiveness was low, the degree of urgency was low to moderate, the degree of endurance in the child was high, and the child’s consent and comfort were priorities (e). In this way, the nurses were able to keep pace according to the child.

When the child’s situation was thus accounted for, and the nurses exhibited a high degree of encouragement, the child then exhibited acceptance for the procedure (f). In cases where the degree of acceptance was high and the degree of procedural smoothness was also high (g), the nurses made on-the-scene comments about the procedure. The most understandable comments matched what was being performed in a clear and concise way, using both verbal and nonverbal forms of communication (h). This combination of encouragement and communication oftentimes enhanced cooperation from the child, thus supporting the success of the procedure.

2.2) Nurse-centred care provision pattern (Figure 2)—The “nurse-centred care provision pattern” describes how nurses performed potentially painful procedures according to their own pace. When using this pattern, most nurses believed that the painful procedure was unavoidable and necessary for the child. Hence, they believed that it was beneficial for the child to complete the procedure quickly rather than at the child’s pace. However, in some cases, nurses performed a procedure in a unilateral fashion, and did not account for the child’s response.

In the nurse-centred care provision pattern, nurses performed potentially painful procedures as follows:

Just as with the child-centred care provision pattern, nurses began by assessing the calmness of the child, then moved to checking the child’s understanding (a, in Figure 2) or soothing the child (b). However, the steps that followed diverged dramatically from the child-centred

care provision pattern shown in Figure 1. In particular, when there was a greater degree of procedural invasiveness, higher degree of urgency, and lower degree of endurance (i) and understanding of the child (j), nurses often decided that quick treatment or reducing the child's burden was a priority and followed their own pace.

When nurses believed that it was beneficial to complete a procedure quickly, that the pace was appropriate, that the methods were being skilfully performed, that measures were adopted based on the specific context, and that the degree of consideration given the child's pain was sufficient (k), they would shift their concentration to the procedure itself. In such situations, the methods were minimally invasive or quickly performed, the child's concerns were not regarded, and a minimum degree of restraint was adopted (q), thus allowing for a smooth procedure (l).

However, at the earlier stage of soothing the child, if the degree of soothing was low and the nurse's behaviour was either irritated or unconcerned (m), then the nurses choosing the nurse-centred care provision pattern still decided to prioritize their own methods (n). Following that decision, if the pace was poor (o), the method forcibly performed, and the child's comfort disregarded, then the child exhibited resistance.

When the degrees of resistance and danger were both high, then the nurses would return to soothing the child (p). However, if the degree of resistance was moderate and the degree of danger was low, then nurses would concentrate on the procedure instead (q). Furthermore, if the degree of the nurses' concentration was moderate, the degree of appropriateness of the technique poor, the procedure forcibly or timidly performed, or the degree of restraint either excessive or less than necessary, then the child might exhibit difficulty in undergoing the procedure (r).

DISCUSSION

Long-term psychological outcomes, such as post-traumatic stress disorder (Rennick and Rashotte, 2009; Nelson and Gold, 2012; Als et al., 2015) and lower quality of life (Polic et al., 2013; Aspesberro et al., 2015), are recognized as a concern for children discharged from PICUs. However, there are avenues for avoiding these negative outcomes. It has been reported that children feel less pain when they participate more actively, rather than passively, in procedures (Uman et al., 2013). Moreover, painless procedures and comfortable or positive experiences may reduce psychological problems among children (Colville, 2008). Nurse-child relationships are believed to be a key promoter of positive psychological outcomes for children following discharge from the PICU (Board, 2005; Carnevale and Gaudreault, 2013). Hence it is imperative that nurses interact positively with their PICU patients during painful procedures, such as by eliciting cooperation from the child.

However, as this study found, one positive action of a nurse is not enough to obtain cooperation from a child. In all procedures observed for this study, multiple specific steps were required before nurses were able to attain the child's assistance in the process. This may be caused by developmental features and situational limited cognitive ability in children (Fine and Sung, 2014; Hollander and Callus, 2014). Therefore, to effectively achieve a child-

centred care provision pattern, several continuing actions and interactions, varied and adapted to the child's specific responses, are needed.

In this study, the overall phenomenon's central category is "considering how to proceed with the procedure". However, within the child-centred care provision pattern, "keeping pace according to the child" is the key category, also thought to be the key to attaining cooperation from the child. Given the importance of this category, ways that nurses can perform "keeping pace according to the child" effectively should be discussed.

First, to effectively work with a child, PICU nurses need to be skilled in physical assessment and should have sufficient knowledge of pharmacology and medical equipment (Dixon, and Crawford, 2012; Hickey et al., 2016). Because highly invasive or urgent procedures are occasionally required in PICUs, nurses may need to follow their own pace and perform procedures according to the nurse-centred care provision pattern. However, if nurses are able to sufficiently consider "how to proceed with the procedure", the child-centred care provision pattern and "keeping pace according to the child" may be a better way to perform painful procedures. By taking the child's status into account, nurses are better able to ensure that the child undergoes the procedure comfortably and with minimal trauma.

For nurses to achieve the child-centred care provision pattern during painful procedures, interpretations of child patients' pain and intentions are critical. However, it is challenging to assess children's pain levels, especially in intense situations, because children often cannot clearly express their feelings (Johansson and Kokinsky, 2009). To interpret children's pain and intentions, nurses have to intentionally read a child's actions using the different types of information the child can express in different ways (Mattsson, et al., 2011).

The nurses who participated in this study used a validated comfort scale to measure pain and level of sedation, but when nurses were using the child-centred care provision pattern, this scale was used only as a clue. The nurses also tried to interpret each child's interactions and responses to the nurses' actions. Interpretations based on nurse-child interactions are therefore key factors for implementing the child-centred care provision pattern.

"Keeping pace according to the child" is also thought to contribute to patient/family-centred care, and thus as a way to bolster high-quality care (Foster et al., 2013). Thankfully, as reported by Mattson et al. (2013, p.534–535.), nurses today are becoming more concerned with "smooth operating nursing care orientation", which lends itself to following the child's pace and considering care that fits the child's immediate needs.

LIMITATIONS

Further investigation is needed to describe the phenomenon of "considering how to proceed with the procedure" in greater detail. Additional theoretical sampling will be necessary as well (e.g., observing a variety of more invasive and urgent procedures). Moreover, cultural understandings should be developed in conjunction with these observations, as different cultures have varying interpretations of pain levels and pain management. While cultural differences may represent only a minor difference in the categories, they still have value in nursing science as a whole. Finally, this study may not be widely generalisable due to the

small sample drawn from just one academic teaching hospital's PICU. Nevertheless, these findings may still be transferable and useful in other PICUs.

CONCLUSION

This study explored how PICU nurses interact with children during potentially painful procedures. Consequently, a child-centred care provision pattern was discovered. To follow a child-centred care provision pattern, it is important for nurses to keep pace according to the child, based on the specific situation. In addition, to attain cooperation from the child, nurses need to combine various tactics and read and respond to the child's status appropriately. This pattern may result in greater cooperation by child PICU patients and possibly in better psychological outcomes as well. Given that PICUs tend to exhibit more nurse-centric than child-centric decision-making processes (Vasli et al., 2015), our study findings suggest a need to reassess how painful procedures are managed in PICUs.

Acknowledgments

This work was supported by JSPS KAKENHI [grant number 25670981, 15H05089] and the National Institute of Nursing Research of the National Institutes of Health [grant number K24NR015340]. Benjamin Brosseau and Tandem Editing LLC provided English language editing support.

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Implications for Clinical Practice

- To attain child patients' cooperation or reduce their pain during painful procedures, a child-centred care provision pattern—which is care that responds to the child's actions or reactions and paces the procedure according to the child—is more effective than a nurse-centred care provision pattern when the procedure is less invasive, not urgent, and the child shows endurance.
- To provide child-centred care, nurses should consider the conditions under which the potentially painful procedure is being performed, and then initiate various actions in response to the child's status.
- Child-centred care involves not only matching the child's pace, but also choosing appropriate procedural techniques while considering the benefits for the child.

Box: Category (Yellow means subject is a child; Pale pink means subject is a nurse)

Arrow: Flow between categories

Italic phrase aside arrow: representative dimension to explain flow of processes (details are referred to the text, Table 1 and 2)

Figure 1.
Typical flow of child-centred provision pattern

Box: Category (Pale green means subject is a child; pale blue means subject is a nurse)

Arrow: Flow between categories

Italic phrase aside arrow: representative dimension to explain flow of processes. processes (details are referred to the text, Table 1 and 2)

Figure 2.
Typical flow of nurse-centred provision pattern

Table 1

Child-related categories

No.	Category	Brief Definition	Main properties	Range that dimensions are placed in regard to corresponding properties
1.2	Calmness of the child	The degree of calmness of the child, based on their appearance. Most of the nurses assessed the calmness of the child.	Degree of the child's calmness (a, b) The child's appearance (a, b)	High (a); low (b) Expressionless/calm (a); fidgeting, struggling, coughing (b)
1.7	Acceptance by the child	The child's acceptance with the procedure, and the child's ability to receive the procedure smoothly.	Degree of acceptance (g) Degree of procedural smoothness (g)	High (g); low High (g); low
1.8	Resistance by the child	The child's resistance against the procedure	Degree of resistance (p, q) Degree of danger (p, q)	Moderate (q); high (p) Low (q); high (p)
1.11	Cooperation from the child	The cooperation of the child with the nurses.	Degree of apparently showing cooperation to the nurse Degree of the child's endurance Degree of positive attitude	High High High
1.12	Ability to keep undergoing the procedure	The child's ability to undergo the procedure, but that the attitude was passive or reluctant.	Degree of keep undergoing the procedure Attitude	High Passive, reluctant
1.13	Difficulty undergoing the procedure	The child's condition that they cannot receive the procedure for a while, when the child seems to be so resisting the procedure.	Degree of receiving the procedure Attitude	Low Raging, painful, agitated

Lowercase letters within aretheses in properties and dimensions correspond to those same letters in the text of pattern description, Figure 1. and 2.

Table 2

Nurse-related categories

No.	Category	Brief Definition	Main properties	Ranges of dimensions are placed in regard to corresponding properties
1.1	Considering how to proceed with the procedure	The judgement of nurses based on procedural pacing and priority, while accounting for the degree of invasiveness, urgency, and endurance of the child.	Degree of consideration (e, i, n) Degree of invasiveness (e, l, n) Degree of urgency (e, i, n) Assumed degree of the child's endurance (e, i, n) Priority (e, i, n)	Enough (e, i); poor (n) Small (e, n); large (i, n) Low/moderate (e, n); high (i, n) High (e); low (i, n) The child's consent/comfort (e); quick treatment, reducing the child's burden (i); the nurse's convenience (n)
1.3	Checking the understanding of the child	An approach where the nurse confirms the child responses, to estimate if the child can understand.	Degree of checking (d, j) Assumed degree of the child's understanding (d, j)	High (d); low (j) High (d); low (j)
1.4	Soothing the child	An approach used by nurses to calm the child, and involves various methods.	Degree of appropriateness of the methods (c, m) Methods (c, m) The nurse's attitude (c, m)	Enough (c); poor (m) Talking to the child in line with his/her response, adopting an empathic or warm-hearted attitude, using analgesics properly (c) Empathic/warmhearted (c); irritated/unconcerned (m)
1.5	Keeping pace according to the child	The nurses match their pace with the child's pace, while encouraging the child to believe that the child can make it through the procedure, considering the child's comfort.	Degree of matching the child's pace (f) Degree of encouraging the child to believe they can make it (f) Methods (f) Degree of consideration to their comfort (f)	Enough (f); poor Enough (f); poor In exact timing with the child, observe carefully, encourage the will to continue (f); just as the child please Enough (f); poor
1.6	Keeping pace according to the nurse	The adoption of the nurse's own pace, as the nurse believes that it would be beneficial for the child to complete the procedures quickly as suited to the child.	Degree of how much the nurse thinks it good for the child to finish the procedures quickly (k, o) Degree of suitability of the pace (k, o) Methods (k, o) Degree of considering the child's pain (k, o)	High (k); low (o) Enough (k); poor (o) Skillfully, taking measures suited to the situation (k); forcibly (o) Enough (k); poor (o)
1.9	On-the-scene comments concerning the procedure	Nurses provide comments that would be understood by the child, by explaining what the nurses will do or what they are doing, in clear and concise language, and also encourage the child.	Comments suited to the child's understanding (h) Content of the comment (h) Methods (h) Degree of encouraging the child (h)	Enough (h); poor What the nurse will do, What the nurses are doing, The point of making the effort (h); makeshift Clear and concise, both verbal and non-verbal, responding to the child's reaction (h); one-sided High (h); low
1.10	Concentration on the procedure	Performance by the nurses of procedures using appropriate techniques, with minimum invasiveness, short duration, and minimal need for restraining the child.	Degree of concentration (l, r) Degree appropriateness of the technique (l, r) Methods (l, r) Degree of restrain (l, r)	High (l); Moderate (r) Enough (l); Poor (r) With the minimum invasion, quickly, turning aside of the child's concern (l); forcibly, timidly (r) The minimum necessary (l); Excessive, less than necessary (r)

Lowercase letters within parentheses in properties and dimensions correspond to those same letters in the text of pattern description, Figure 1. and 2.