CLINICAL PRACTICE

A qualitative national study of nurses' clinical knowledge development of pain in pediatric intensive care

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Abstract

Background: Vulnerable children undergoing intensive care might still experience pain when they should not, due to nurses and pediatricians insufficient knowledge about how critical illness affects childrens' signs of pain. How signs of pain are learned in clinical practice might be one of the remaining aspects in nurses insufficient pain alleviation. In the workplace learning is directed by what the units shared meaning finds as significant and meaningful to learn. However, what it is viewed as meaningful to learn about pain from the nurses' perspective might not be meaningful from the child's perspective. When working together in the PICU, nurses rely on each other and interact in many ways, and their understanding is related to situated knowledge and facilitated by a personal reference group of colleagues. Professional concern, depending on culture, traditions, habits, and workplace structures forms the clinical learning patterns in the PICU. However little is known about nurses' clinical learning patterns or collegial facilitation within the PICU. These assumptions lead to the aim of the study: to elucidate patterns in clinical knowledge development and unfold the role of facilitator nurses in relation to pain management in the PICU.

Method: The study had a qualitative interpretive design approach using semi-structured interviews, analyzed with qualitative content analysis to elucidate both manifest and latent content.

Results: The findings elucidates that the workplace culture supports or hinders learning and collaboration. Knowledge development within practice is closely connected to the workplace culture and to nurses' significant networks. The findings also clarify that nurses needs to feel safe in the workplace and on an individual level to build and rely on significant networks that facilitates their own personal knowledge development. There is an ongoing interaction between the learning patterns and the facilitation the significant networks offer.

Conclusions: Nurses need to embrace effective learning about children's pain from day one. Lack of a facilitating structure for learning, lack of assessment within clinical practice, and the focus on the individual nurses' learning are remaining considerable problems when it comes to alleviating the vulnerable child's pain. To increase the possibility of pain alleviation in the clinical setting, it is of importance to attend to the caring culture and build a safe collaborative

culture that is patient centered. This requires an environment that allows for open discussion, where questioning and reflecting is a natural part of the culture within the group. These factors need highlighting and thorough examination from the organization. Nurses focus on learning, and interact in a learning community of practice that is furthered when they experience a safe environment and find that their questions are taken seriously. Approaches to promote a scholarship of nursing care are needed to develop clinical learning and, consequently, raise the quality of pain care.

Key words

Clinical knowledge development, PICU, Nursing, Cultural influence

1 Introduction

Vulnerable children undergoing intensive care might still experience pain when they should not. Because of the insufficient knowledge nurses and pediatricians are reported to have about how critical illness affects childrens' signs of pain [1]. The present study puts a clinical learning perspective on how knowledge of pain is gained in the Pediatric Intensive Care Unit (PICU). According to Twycross [2], education has failed to prepare nurses in using a clinical approach towards pain alleviation and clinical pain management in general. Furthermore, Franck and Bruce [3] as well as Simons and Moseley [4] argue that pain alleviation is hindered since pain is not correctly recognized. Morris and Blaney [5] have found that learning in the workplace is directed by what is found to be significant and meaningful to learn. However, the nurses' perspective on what is viewed as meaningful to learn about pain might not be the most prioritized activity from the child's perspective. How knowledge about pain develops in the PICU may have critical implications for professional development and clinical learning about pain as well as the quality of care given.

1.1 Background

Swedish nurses were found to have good theoretical knowledge about pain behavior in general [6]. However, when interviewed, nurses working at a pediatric department mediated difficulties in interpreting young childrens' pain related behavior [7]. In the Pediatric Intensive Care Unit (PICU), children are often unable to communicate their needs [8], which complicate the recognition of pain. And nurses at the PICU have been found to perceive severely ill children's expressions of pain in a variety of ways, such as a change in measurable parameters, muscular tension as well as altered behavior [9]. Furthermore, when nurses judged the child's pain in the clinical situation, clinical judgments were found to derive from different levels of understanding and containing diverse aspects of pain [10]. Olmstead [11] realizes the importance of nurses' clinical performance and argues that this divergence is one of the remaining obstacles in order to achieve quality in pain alleviation.

1.2 Clinical knowledge

Clinical knowledge develops over time in clinical practice as nurses are engaged in encounters with patients, meeting their caring needs [12-14]. Specific knowledge the individual brings from such a social situation, to share and rely on in the future, depends on the cultural circumstances [15]. Benner [16] found the caring knowledge to be shared among nurses in the workplace through dialogue with their understanding related to situated knowledge and facilitated by a personal reference group of colleagues [16]. In their daily work nurses in the PICU rely on each other and interact in many ways and share knowledge for the good of the patient [17-19]. Similar behavior of sharing knowledge was found among academic leaders who were committed to a few colleagues building significant networks [20, 21]. Colleagues are likely to affect personal beliefs and assumptions made. By building significant networks, people connect to each other, create opportunities to test new ideas, or discuss matters of professional concern, depending on culture, traditions, habits, and workplace structures [20, 22]. The PICU context requires that nurses react instantly and precisely in situations of suspected pain, in a surrounding full of lights and sound signals, with colleagues having different priorities, during complicated medical treatments [23]. This raises a concern that the context contributes to the difficulty of recognizing children's pain, and influences what is learned as well as the learning process [16].

1.3 Learning in the nursing community

Nursing care is a complex and self-improving practice [19] that requires an ongoing dialogue and collaboration in the workplace about research and its implications in everyday practice [24]. Morris and Blaney [5] emphasized that extension of knowledge is consequently reached through work activities in interaction with others. Nevertheless, workplace learning does not only mean development of skills. And a PICU can be described as what Wenger [26] calls "a community of practice". A community of practice is characterized by a group of individuals who share a domain, a community and a practice.

Knowledge development of pain in the PICU setting by experienced nurses remains poorly researched. For the sake of these vulnerable children, this problem demands attention. For example, PICU nursing students prefer learning through discussion with knowledgeable experts in the field [25]. However we know very little about nurses' clinical learning patterns after graduation. Due to lack of recent studies on the clinically experienced specialist nurses' knowledge development, studies of nursing students' clinical education in accelerated programs were chosen for review [27-31]. What emerged as significant was that students' everyday education was always related to a facilitator and a purposely-arranged teaching environment. Where collaboration and interactions whit others, sharing knowledge towards a common goal in trust occurred. This differs from the graduated specialist nurse's conditions.

1.4 Workplace culture as critical for clinical knowledge development

A workplace is a place where styles and habits of social groups have an impact on how learning and teaching occur, as well as on the climate of support or impediments, collaboration and cooperation [16]. In the workplace, an overall view of belonging, values, and culture is established and becomes shared [32]. The culture, in the sense of the workplace, is recognized as an important factor for nurses' retention or engagement, related to the facilitation they experience [33, 34]. The culture is to be viewed as a dynamic phenomenon on different levels that has the ability to change individual behavior due to changes in one level of culture elsewhere [35]. The caring culture studied by Rytterstrom [36] reflects likewise the climate of the group, caring attitudes, and actions taken based on the unwritten routines and rules that form the workplace culture. From this view, culture is a creation of negotiated meaning [26].

Säljö [15] states that to understand why some groups learn in a particular fashion, one needs to understand the interaction between the individual and the collective. Workplace culture can be viewed as both the overall and the collective influence in the workplace. Erez and Gati [35] emphasize the structural and dynamic dimension of culture as meaning bearing and affecting shared behavioral norms and values. Values are shared and transmitted through the social learning processes of modeling, observations, and interactions. And as Benner [13] asserts, nurses become practitioners through education and socialization with other practitioners in the workplace.

A collaborative culture [37, 38] facilitates skills and knowledge growth, and a lack of possibilities to collaborate influences knowledge development negatively. In order to learn, some sort of facilitation is needed [39] that influences the individual level of knowledge development. In clinical practice, nurses can be expected to build clinical structures and connect with co-workers that facilitate and influence their knowledge development of pain. How the knowledge of pain is developed and how pain can be recognized in critically ill children are of relevance for the quality of care and pain alleviation. However, little is known about nurses' clinical learning patterns or collegial facilitation within the PICU. These assumptions lead to the aim of the study: to elucidate patterns in clinical knowledge development and unfold the role of the nurse as facilitator in relation to pain management in the PICU.

2 Method

The study had a qualitative interpretive design approach using semi-structured interviews, which were analyzed with qualitative content analysis to uncover both manifest and latent content [40].

2.1 The context of the study

The study embraces all pediatric intensive care units (N=3) in Sweden, specifically built and equipped for the most severely ill children in the country. The units offer 25 beds in sum. Many different specialties such as: surgery, medicine, neurosurgery, heart surgery, trauma, organ transplantation, and infection are included. Newborns and children up to 18 years of age are cared for in all three units. At the units, children need help to manage failures of vital functions, acute or manifest, such as: respiration, circulation, infections, and other life-threatening conditions. Many of the conditions the children suffer from, or the nursing care given to treat them, may result in the child experiencing pain. During the vulnerable child's hospitalization, nurses play a key role in pain alleviation based on their knowledge and experience of pain. Pain assessment scales and general prescriptions, adjusted to age and weight, are available for nurses to use if they choose in order to support nurses in pain recognition and pain alleviation.

The PICU nurses care for children undergoing various forms of respiratory problems from conventional ventilation to high frequency oscillatory ventilation (HFOV) treatment, Nitrogen oxide (NO) treatment, and Extra Corporeal Membrane Oxygenation (ECMO) treatment. It includes Pediatric Emergency Transport Service (PETS) that transports patients in Sweden and throughout Europe. In two of the PICU's, nurses also care for children undergoing complicated open-heart surgery.

2.2 Participants

The respondents consisted of thirty registered nurses (twenty-seven women and three men). The selection was done by convenient samples of those nurses in the settings that were specialist nurses and who agreed to participate. All participants had specialist training in intensive care, pediatrics, anesthesia, or the older form of advanced training that rendered competence within both anesthesia and intensive care. Their PICU experience varied between three weeks to thirty-seven years.

2.3 Data

Data consists of tape-recorded and verbatim-transcribed interviews that were 20-60 minutes long. The interviews were recorded at the workplace in a separate room. The intention was to capture the workplace culture where the nurses act on an everyday basis and let that influence their responses. A semi structured interview guide with questions influenced by Benner and Wrubel [18] and Benner, Tanner and Chesla [16] were used. The following themes were discussed: emotional involvement, problem engagement, environmental hindrances, and environmental facilitations.

2.4 Ethical considerations

Ethical approval for the study was obtained from the head of the clinic as well as from the ethical committee at the Karolinska Institute 2011/244/31-1. All respondents gave their informed consent to participate. They were informed that they could cease participation at any time.

2.5 Content analysis

Krippendorff's [40] reports on content analysis and its application has been indicative in the analysis and interpretation. The analysis process, described below, was carried out in such a way that both the manifest and the latent content were searched for.

The first step was the interview session, followed by the getting acquainted phase when the interviews were transcribed. Parts of the text, the manifest content, were marked (meaning-bearing units) in relation to the study purpose. In the second step, the meaning-bearing units were encoded, and the text condensed, which meant shortening and decontextualizing the text while preserving the nucleus (the common elements). The third step meant concentrating on the condensed units and assigning code words to them, that is, words covering the content of the condensed units. The underlying (latent) meaning was interpreted and code words with the same latent meaning were combined in sub-categories to form new code words on

a more abstract level. In the fourth step, categories related to the context emerged by comparing the manifest and latent content of the code words (emerged in step three) to the interview texts and bringing them together into categories. These were interpreted against the culture and traditions that exist within PICU (recontextualization). The prior understanding of the context that the first author had as a former PICU nurse was meaningful in the analysis and interpretation process, particularly in the fourth step. The fifth step involved the naming of categories and dimensions that had emerged, based on both the manifest and latent content.

3 Results

The findings illuminate the cultural and collectively shared learning patterns: 1) Practical learning dimension with the categories a) Observation Orientation, b) Intervention Orientation and 2) Scholarship of nursing dimension with the categories a) Self-directed learning Orientation, b) Reflective Orientation, and c) Interaction Orientation. The findings also clarify how nurses on an individual level build and rely on significant networks for facilitation of their own personal knowledge development, based on the dimension: 1) Safety with the categories a) Confirmation Orientation, b) Extended Knowledge Orientation, and c) Freedom of Action Orientation. There is an ongoing interaction between the learning patterns and the facilitation the significant networks offer. All categories focus on qualitatively different ways to develop and facilitate clinical knowledge of pain assessment in a clinical context.

3.1 Practical learning dimension

The findings reveal that clinical practice from this aspect is viewed as the main source of knowledge development. The learning is further viewed as being local, individual, and focused on skills development. Evident a simultaneous exchange between the practical knowledge and the theoretical/scientific knowledge described in scientific journals is absent in this dimension. The phrase "experience from my work" is commonly expressed in relation to knowledge development. The nurses perceive learning by experience as including observations and interventions. From this perspective, theoretical knowledge is an impediment to knowledge development due, to some extent, to a perceived mismatch between the theoretical content and the experience of phenomena in the clinical practice. The following quote may illustrate the dimension:

> *"It is in the clinical context I learn, here with the children, this you can't read a book about." (Interview 3)*

a. Observation Orientation

This aspect of learning includes experiences from observations accumulated over time. By observing children nurses learn to be aware of the variety of observable signs of pain as reflected by a change. Learning in this category is supported by the number of children met and observed over time in the PICU context. Experiencing variation in signs of pain facilitates the understanding of how the child expresses pain and is used as a reference to build upon. Through observations, the knowledge of the "true" and "real" expressions of pain develops. The following quotes show how the experience of clinical work is highly valued as a facilitation of increased knowledge and ability to perform accurate pain assessment:

> *"/.../ But mostly I think if you have worked for a while, you look for the differences, what's a bit more normal movement and what might not be normal." (Interview 30)*

The intuitive aspects in experiences as well as interpretations are disclosed in the next quotation:

> *"It is a lot with this here with how you, how the patient feels. You learn that actually when you stand next to the patient. Empathize; try to understand how they feel. That is good bedside manners." (Interview 11)*

b. Intervention Orientation

In this category, knowledge development is experienced through the outcome of the intervention. The knowledge development is directly connected to experiences of results from individual nurses' own active interventions. The nurses learn to recognize various signs of pain and which pain alleviation gives the best effect through trial and error. To try things out for the "best" solution is considered to be a source of increased capacity and increased flexibility. This pattern of learning essentially relates the present context against previous experiences, emerging over time. The following quotations show how the clinical practical intervention is central to experience and knowledge development:

> *"To ...- I evaluate (the intervention) and what I get for effect on it and if I get no effect then I continue and, if there is anything I can solve or not ... if I do not get the effect I want. .... then there is something else that is wrong." (Interview 10)*

3.2 Scholarship of nursing dimension

The correspondence between clinically experienced phenomena and other sources, as confirmed by research in scientific journals, reflection, and conferences, is viewed as the main source for knowledge development. The learning focuses on an extension of knowledge using simultaneous exchange between the practical knowledge and the theoretical/scientific knowledge. The nurses are engaged in broadening and deepening their knowledge of pain alleviation by critical thinking, and systematically questioning their own thoughts or interventions as well as reflection on experienced phenomena. Contrasting what is known against experiential knowledge prevails as the main source of knowledge development. Based on the interviews, these aspects were found to be either self-directed or interactive.

a. Self-directed learning orientation

An autonomous individual motivation to understand and develop existing knowledge is a key driver in this pattern of learning. It is viewed as a lonely activity based on one's own responsibility. Furthermore, the surrounding culture has a direct connection to the knowledge. For example, the following quote shows that self-direction was fundamental to the knowledge development:

> *"To sit down and learn more about what you think that he has for a diagnosis or how it can turn out. There is a lot that I spend time on at home in order to build my knowledge base". (Interview 15)*

b. Reflective Orientation

This category includes personal reflections, thoughts, and small studies as important sources of learning and knowledge development of pain alleviation. Nurses strive to learn to individualize pain alleviation based on the specific childs' needs. This is learned through deliberate critical thinking and active, systematic reflection. The following quote shows how nurses reflect through questioning, and validating their assumptions connected to obtained experience, theory, and research:

> *"You have to hold many things in the head. Because many times before you hang up your coat, before you go home, I still have time to think back over my day and see if this worked or you can feel a little frustrated that it was something that didn't, that it could have ended better or like that." (Interview 8)*

c. Interaction Orientation

In this category, the surrounding cultural support for learning in the clinical practice is of importance for knowledge development. The nurses try to learn more about pain and pain alleviation in general, and confirm their learning through various interactions with colleagues. Knowledge development consists of a supportive learning environment, described as

a collegial work atmosphere, leading to nurses feeling at ease because they are taken seriously and finding good solutions to their difficulties. This increases their confidence and security in coping with pain alleviation situations.

A humble response from colleagues, free from sarcasm or condescending attitude is highlighted as an important means of support. Good contact with children and parents also increases the ability to see variations in the child's condition. A calm and stress free working environment is said to be desirable. Reflections on what the nurse does, how and why she makes a certain intervention are also important. Providing nursing care for the same child over time increases the feeling of being able to alleviate pain early on and adequately. Conversations with other colleagues on the phenomenon are also perceived as important. By talking to colleagues about specific patient cases and their outcomes, nurses gather new impressions or confirm knowledge they already possess. Knowledge consolidation and acceptance by someone else facilitates knowledge development. The following quote shows the surrounding contexts relevance to clinical knowledge development and learning:

> "I do so in all cases, when we are two or more in the room and someone else has worked there more often or previously or like that, then you ask... what do you think? Has it been like this, has she behaved like this? What did you do, etc., etc." (Interview 2)

3.3 Clinical use of networks relying on safety

The findings reveal that nurses' build significant networks within their community of practice and their view of knowledge development varies due to the way their significant network is built. A network not only facilitates knowledge development, it can also preserve knowledge. Nurses commit to a significant network of three to seven co-workers in their daily work related to pain in the PICU, and their aim is to perceive knowledge or develop knowledge toward different levels of understanding. Their significant network consists mainly of former supervisors, someone more experienced or someone chosen to give freedom of action in their work. The feeling of being in a safe relationship, safe enough to ask "stupid questions" and to show one's knowledge deficit is a common feeling for nurses' choice of members in their significant network. The following quotes highlight the importance of a safe relationship where one dares to show shortcomings, but they also show the importance of a safe relationship to make knowledge development possible:

> "If I want to ask something or want an answer I can rely on, I ask my former supervisor because then I know she will answer me without judging my ability." (Interview 15)

> "Then there are some who you have as favorites that you turn to. You know that you always get a good answer, they are very good at explaining, explaining to another, you feel that they have patience with others. Then it becomes easier that you turn to them." (Interview 1)

Findings reveal that communication with ones co-workers is a prerequisite to becoming accustomed to the ward culture and accepted in the group. To build a significant network is to be understood and accepted in the workplace culture. Alienation denies access to the learning patterns in the workplace. Nurses may also choose to avoid communication with co-workers with the intention of keeping or gaining a certain position within the community of practice. This prevents the emergence of knowledge development, and affects the working-culture negatively as shown in the following quote:

> "These experienced sisters, do not want to share their experience, their knowledge. They do not want to spread. But they want to show like this, I can. High and mighty. They stand and want to see that it works well, you know, they absolutely do not want to share the knowledge they have, the ward will feel oh we do not have someone who can, you must, please, can you. That part will disappear if we all can. Things like this, there is, between the staff." (Interview 3)

3.4 Confirmation orientation

Clinical knowledge development was not a focus in this category. Instead, nurses turn to their significant networks (another nurse, nurse's helper or physician) to get confirmation on being on the "right track" and not doing something wrong or something that can harm the child. The next quotes show how a significant network is important as a matter of patient safety:

> *"It's about knowing that you have some shared values and that you have thought this team way of thinking. We have tried to create a unity in what we do. It's not only about taking care of patients, but also the relatives. We might have been responsible for the patients together and so on." (Interview 2)*

> *"You want a confirmation that you are thinking correctly." (Interview 19)*

3.5 Extended knowledge orientation

In this category, the emphasis is on extending one's own knowledge development from others. The significant network can consist of another nurse, a nurse's helper or a physician, all with more experience related to pain. The different aspects that the nurse wants to learn can relate to diverse needs such as caring skills and theoretical matters or nursing matters related to alleviation of pain. The following quote shows how the significant network is involved in extending the knowledge of a co-worker sharing their expertise in the field:

> *"Then you have doctors of course. Then it depends a bit on who it is, I admit. There are days when I think it works exactly, you have someone who is really experienced and talented, well informed and who is good at explaining as well. It's not everyone that can do that, how it connects together." (Interview 5)*

3.6 Freedom of action orientation

In this category the nurses show patterns of mainly consulting physicians in their significant network to be able to exceed the general limits of medication or ordered physical limits, based on their understanding of how to care for the child in order to reach pain alleviation. The nurse's creativity is shown as she already has a strategy for pain alleviation. She turns to her significant network with the purpose of obtaining the freedom to choose intervention, as she sees fit, when the child needs it. The nurse evaluates the child's situation right now or what the situation may come to, and based on that she creates space for her nursing care actions by asking the physician to prescribe medications in advance. A practical action that her significant network can support, as the quote below highlights:

> *"If I would like to have something else, then I do not get as much help if I am discussing it with another nurse, for they cannot prescribe. I want to have a prescription, it's all mostly about other drugs or to try something new." (Interview 24)*

4 Discussion

An effort to elucidate clinical knowledge development in relation to pain alleviation within the PICU, and the role of nurses' significant networks has driven this study. Findings show that nurses' patterns of clinical knowledge development of pain in the PICU are interrelated with the workplace culture and the significant networks they commit to in order to find meaningful support. As people share a mutual engagement in caring for the young patients in critical care, the domain, they develop a community with a joint enterprise, where the members of the community influence the practice and direction of the care given through a shared repertoire consisting of shared experiences, stories, or knowledge of how to address recurring problems – a shared practice.

The differences of learning patterns found are possible to explain as formed by the ward's culture and medical specialty, a perspective brought forward by Rytterstrom [36]. Within the practical learning dimension category, it's the clinical practice

that is viewed as the main source of knowledge development. However the knowledge development is traditional and practical influenced, "nursing skills learned by doing/performing". The nurses are guided by own experience of practice regarding what to learn, rather than a collective discussion or reflection of what the child needs. If nurses rely on what they by experience know will work in a particular situation or rely on static collective cultural traditions ("this is the way we do it here"), they might never see or meet the child's caring needs nor will they make the best clinical decisions in a given situation. Oandasan and Reeves [39] argue that knowledge development should shift between reflection and action, something that seems to happen only when reflection built on pedagogical questions are applied (who, what, where, etc.). The scholarship dimension pattern includes a practical focus that differs in the way of reasoning from the practical learning dimension. Scholarship of learning can be referred to what Benner [16] calls "embodied knowledge" or knowledge that emerges from practice before it is theorized by the recognition of subtle changes. When nurses embody knowledge, this is performed not only by experience but also by reflection and investigation as they pose questions such as: "why is it like this", "what am I feeling", and "when do I feel this". They also turn to the community of practice, literature or other sources of input to validate or discuss their findings. It can be argued that the nurses use some sort of peer review or small investigations to develop and extend their knowledge. The knowledge development then becomes what Lave and Wenger describe as a dialogue, that is, reasoning [41].

In the clinical practice there is a lack of facilitators with pedagogical training that pose reflective questions that can be used in everyday caring situations. This leaves the nurses to rely on discussions in their significant networks. The findings indicate that nurses turn to their significant networks with different purposes in mind, for example, to be assisted and get confirmation in a somewhat insecure situation.

If the significant network is used for confirmation, experienced nurses might not be challenged in their assumptions. And if the nurses are occupied with constructing a shared meaning of pain care and guard their position by not sharing knowledge, they might contribute to a culture that neglects the patients caring needs. However nurses might also turn to their significant networks to expand their knowledge. This is similar to what Morris and Blaney [5] described as elaborating on what they know, and assumptions of what to do. This also gives them freedom to choose intervention on their own, as the nurses are expanding their knowledge between the tension of the known and the unknown [15]. When using strategies for knowledge development in interaction with others, for instance, scientific knowledge, nurses not only show responsibility for their own learning but also for the development of the learning within the community of practice, as described by Bolander Laksov [32]. This pattern supports a continuing search for knowledge integration between the theoretical and clinical perspective.

The workplace learning patterns and significant networks can be interpreted as mirrors of the culture, and should be highlighted as important aspects of quality of care. A dysfunctional environment can lead to an arena for a covert power game [42] where nurses can become powerful gatekeepers to the community of practice by jointly deciding if they aim to support each other by sharing knowledge or not. This is a subtle selection, shown in the workplace culture, of who is allowed to influence the meaning and learning in the community of practice. Bolander Laksov and Morris and Blaney emphasize the importance of understanding the underlying ideas of learning to develop the community of practice [5, 32]. How the development of knowledge is organized within practice is an important aspect for the outcome of workplace learning, related to the individuals' engagement in the work and their responsibility taken for this development. However, the whole community has to be facilitated in the desired direction to influence the thinking and learning of an individual practitioner [32]. Further research from the nurses' perspective in the caring situation is needed to unfold how nurses meet the child's pain, to shed further light on the problems with pain alleviation.

In the analysis of our data we strived to unfold the latent meaning as well as the manifest meaning; the manifest meaning can be seen in descriptions of actual behaviors and organizational structures. The latent meaning answers the underlying choice of guidance and meaning of learning relations in clinical knowledge development [40]. In this study, all PICUs in

Sweden were included, and it can be argued that the findings of the study not are influenced by the culture at a single PICU. It is also reasonable to assume that nurses' learning patterns are not static, rather varying over time and in tune with the community of practice in which nurses are engaged. Lave and Wenger [41] argue that learning is a process of participation in communities of practice; a learning that gradually increases as the person engages in practice.

5 Conclusion

The conclusion that can be drawn from this study is that lack of a facilitating structure for learning, lack of assessment within clinical practice, are remaining considerable problems when it comes to alleviating the vulnerable child's pain. Nurses' knowledge development within practice is interrelated to the culture and their significant networks. Therefore, nurses need to focus on their individual learning and embrace scholarly learning about children's pain from day one.

6 Clinical implications

To increase the possibility of pain alleviation and quality in the clinical setting, it is of importance to attend to the caring culture and build a safe collaborative culture that is patient centered. This requires an environment that allows for open discussion, where questioning and reflecting is a natural part of the culture within the group. Discussions and questioning should be based on the clinical context and co-workers' different experiences of what happens when the child feels pain. Sample questions include: What knowledge is needed to interpret the child's pain? What requirements should be in place for a good pain assessment? How can we alleviate the pain for the individual child in the best way? Another way is to use case methods or practice pain management within a clinical teaching ward. For new employees, observation based peer review can be a great way to develop knowledge about pain, giving them access to experienced colleagues' experience. These factors need highlighting and thorough examination from the organization. Nurses focus on learning, and interact in a learning community of practice that is furthered when they experience a safe environment and find that their questions are taken seriously. Approaches to promote a scholarship of nursing care are needed to develop clinical learning and, consequently, raise the quality of pain care.

Suggestions for facilitating a clinical learning culture include:

1) Make facilitation that poses reflecting questions available through clinical facilitators.

2) Facilitate teamwork in collaboration with other professionals in an effective way, concerning the child's pain alleviation.

3) Clarify the individual nurses' responsibilities and obligations related to pain and pain assessment as well as analgesic aspects.

4) Support nurses' awareness of their work as members in the health care organization through cooperation, and how to perform common pain related work tasks in their ward.

5) Support nurses' appropriate use of pain expertise through constructive collaboration with colleagues and experts from other professions in health care.

6) Support nurses in establishing and nurturing significant networks for the sharing of ideas, reflections and questions, for instance by creating mentor programs or other arenas for professional exchange within the community of practice.

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