

Pediatric Pain Management Practices in Postoperative Units – an Intervention Study

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Summary

Despite available research on pediatric pain management, pain is still underestimated and undertreated. According to research, nurses' attitudes and lack of knowledge are some possible causes. This study will explore nurses' pediatric postoperative pain management practices. The aim is to evaluate if a tailored educational intervention with nurses working in postoperative units improve their knowledge and attitudes of pain management and pain management practices. This is a tailored educational intervention study with a pre-post design and a comparison group (baseline T-1, one month after intervention T-2, and six months after intervention T-3), including a sample of nurses working in six postoperative units. The units are the largest pediatric postoperative units of each of the six university hospitals, covering all health regions in Norway. Three different approaches will be used (survey with questionnaire of the nurses, observations of clinical practice, and interviews with children) to collect data about pediatric pain management practices in this study.

Background

Pain in children and adolescents is underestimated and undertreated even if a lot of research is done in the area (1, 2). Research suggests that lack of knowledge about pain and pain management in children are one of the reasons for the undertreatment (3-14).

As late as in the 1970's and 80's premature and newborn children went through surgery without pain medication (15) because it was claimed that the children could not feel pain since the nervous system was not fully developed. More recent studies show that preterm infants are hypersensitive to pain (16), and that surgery in the neonatal period can lead to prolonged pain and hypersensitivity in the damaged area (17, 18).

Untreated pain can cause unnecessary suffering, increased risk of complications, increased risk of morbidity and mortality, as well as lead to longer hospital stays and increased cost (19). Long-term consequences of inadequate relief of acute pain can be chronic pain for 10-50% of the patients, of which 2-10% of them will experience severe chronic pain (19).

Nurses who work at postoperative units have a considerable responsibility to ensure optimal pain management. Research shows that the use of guidelines and pain assessment tools improve the pain treatment of children through systematic assessment and evaluation (20, 11). However, more than half of European hospitals are reported to lack written guidelines for pain treatment and more than half of the patients experience severe pain (21, 22).

Pain assessment in children is largely based on patients' self-reports and nurses' assessment and the use of observational pain assessment tools (23, 24). There are many types of pain assessment tools for children (behavior form, face form, numerical scales) (11, 25-29), but no pain assessment tools are suitable for all children as it must be selected on the basis of the child's age, developmental level and context (27).

Few studies have examined the effectiveness of educational interventions on pediatric nurses' pain management (7, 30-33). The studies showed improved perception of pain assessment and management (30), improved knowledge of pain management (7, 31,32) and increased use of non-pharmacological interventions (31). Johnston et al. (31) & Le May et al. (32) studied if there were any change in nurses' analgesic administration and found that there were no significant change. Vincent et al. (33) conducted a pilot intervention study which showed significant improvement in nurses' beliefs and pain management practices. All studies have small samples, except Ellis et al. (30), and only Johnston et al. (31) had a comparison group. None of these studies have measured if tailored educational intervention improve nurses' pediatric pain management practice by observing the nurses or examined the children's experience of pain and pain management. There is a need to explore this further.

Objectives

The main objective of the present study is to improve pediatric postoperative pain management. This will be achieved by first exploring the pediatric postoperative pain management practice using different approaches (study 1). Then, an intervention will be developed based on the results from the first study and available research in the area (study 2). After that, we will investigate if the tailored interventions with nurses at postoperative units improve the nurses' knowledge of pediatric pain management and pediatric pain management practice (study 3). The different studies are presented in Table 1:

Table 1: The studies

	Studies	Activity
Study 1	Explore nurses' pediatric postoperative pain practices	Data collection (baseline T-1) using : • Questionnaire PNKAS-N

		<ul style="list-style-type: none"> • Observational study of clinical practice • Interview with children
Study 2	Develop a tailored educational intervention	<p>Develop a tailored educational intervention based on:</p> <ul style="list-style-type: none"> • Available research • Results from baseline • Feedback from the head of the relevant units • Staff views about the facilitators and barriers to optimized pediatric pain management
Study 3	Implementation and evaluation of the intervention	<p>Implementation of the intervention</p> <ul style="list-style-type: none"> • Seminar (lecture and workshop) • Clinical supervision • Reminders <p>Data collection (T-2 and T-3, one and six months after the intervention)</p> <ul style="list-style-type: none"> • Questionnaire PNKAS-N • Observational study of clinical practice • Interview with children

Study 1 Exploring Nurses' Pediatric Postoperative Pain Practices

Research questions

What kind of knowledge and attitudes do nurses working in postoperative units have about pediatric pain management?

How do nurses manage the pediatric pain practices in postoperative units?

What is the children's experience of pain and pain management after surgery?

Three different approaches will be used (questionnaire, observation and interview) to collect data about pediatric pain management practices in this study.

a) Survey with Questionnaires

Sample/Setting

The study will be conducted by nurses at six postoperative units, which have children and adolescents after surgery. The units are the largest pediatric postoperative units of each of the six university hospitals, covering all health regions in Norway. All nurses (259 nurses) working with patients in these units will be asked to participate in this study.

Data Collection

Data from the nurses regarding knowledge and attitudes toward pain management will be collected using "The Pediatric Nurses' Knowledge and Attitudes Survey Regarding Pain Questionnaire - Norwegian version" (PNKAS-N). The PNKAS was developed by Manworren (9) and translated into Norwegian tested and validated according to Norwegian conditions by Hovde et al. (5). The questionnaire is based upon guidelines for acute pain management in infants, children and adolescents, American Pain Society, The World Health Organization and the Joint Commission on Accreditation of Healthcare Organizations (9, 10). The PNKAS-N consist of 40 questions about general pain management, pain assessment, and use of pharmacological and non-pharmacological treatment of pain in children. Several items are related to areas in pediatric pain management where lack of knowledge has been reported. An appendix of the questionnaire register the nurses' age, education level, work experience and full-time equivalent. An additional section has been added to the questionnaire in order to get the staff views about the facilitators and barriers to optimized pain management. The PNKAS-

N will be distributed to the nurses three times, at baseline (before the intervention), and one and six months after the intervention.

Data Analysis

The data will be analyzed using statistical methods (SPSS). Descriptive and correlational statistics will be used to describe and summarize data (34, 35). Means, standard deviations, medians, and interquartile ranges will be calculated for continuous data. Frequency counts and proportions will be calculated for categorical data.

b) Observational Study

The aim of this part is to obtain more knowledge about how nurses actually manage post-operative pain in children and whether pain management practices adhere to current best practice guidelines.

Sample

Non-participant observational studies will be conducted at all six units at baseline. Each unit have 40-60 nurses working with patients and 10-15 children undergoing surgery every day, 50-75 children/week in total.

Data Collection

During each data collection period, observations will be carried out for four-hour periods (day and evening), two weeks per unit (40 hours per unit per occasion, 240 hours in total). The observational study will focus on observing the nurses general pain management practice, pain assessment (use of pain assessment tools), use of pharmacological and non-pharmacological treatment of pain in children. A checklist and field notes will be used based on the PNKAS-N themes and essential areas of pediatric pain management identified in a literature review (36). Field notes will include descriptions of what is occurring during the period of observation and records of comments made by nurses related to pediatric pain management. The field notes will be recorded partly during the observation and partly after the observation (directly after), depending on the situation at the unit. No data about the child will be recorded except age, gender, type of surgery, and days since surgery. The other data that will be recorded is what the situation gives, but no data that can identify the patient will be recorded. The checklist will be pilot tested based on two different observation situations.

Data Analysis

Data from each nurse will be collected by using the pain management checklist and summarizing each of the nurses' pain management practices. A content analysis will be carried out on data within the field notes (37, 38). Information in the field notes will be examined for common themes (35, 39). Using highlighter pens, the researcher will code the data in each of the categories. After the data in the field notes are coded, the researcher will identify recurring themes and compare this to the data from the pain checklists to provide a picture of current pain management practices. The data will be given to another experienced pediatric nurse who will code the data without any knowledge of the themes identified by the researcher, to minimize researcher bias. After having coded the data the researcher and the second coder will discuss and agree upon the final wording of the themes.

c) Interview with Children

The aim of this part is to obtain more knowledge about what are the children's experiences of pain and pain management after surgery.

Sample

Twenty children older than six years going through surgery at the time of data collection at two of six units (randomly chosen), and their parents, will be asked to participate in this study.

Data Collection

The draw and write technique (40, 41, 42) will be adapted for use with children aged 6-9 years allowing them to draw and tell, draw and write or write their story about how well their pain has been managed in hospital. Older children will be offered the option of individual interviews. The semi-structured interview schedule will reflect the questions used by Polkki et al. (43) and the Royal College of Nursing (44) and include questions related to:

- *Have you had any pain while you were in hospital?*
- *Were you asked if you had any pain?*
- *Who asked you about your pain?*
- *How did the nurses help you when you were in pain?*
- *Do you think nurses can help children in pain in a better way?*
- *What is tolerable pain to you?*
- *Do you have pain at rest and when you move?*
- *Does the pain limit your daily activities?*

All children will be asked to rate the worst pain experienced during the first 48–72 hours postoperatively using a numeric rating scale (NRS) from 0 “no pain” to 10 “worst pain imaginable” or a face scale depending on their cognitive capabilities. All children taking part in the study will also be asked to rate the worst pain experienced during the post-operative period as well as their current level of pain. These interviews will take place before the child is discharged from hospital, and all interviews will be tape recorded. The interview guide will be pilot tested in two different interviews.

Data Analysis

Children’s responses to the interview questions will be transcribed verbatim. Content analysis will be used to analyse the transcripts using a five-step approach (45):

- 1 Creating and organising files for data
- 2 Reading through the text and forming initial codes
- 3 Describing the social setting, people involved and events
- 4 Analysing data for identifying emerging themes
- 5 Interpreting and making sense of the findings

****Study 2 Develop the Tailored Educational Intervention****

The intervention will be developed based on available research, results from baseline in the present study and staff views about the facilitators and barriers to optimized pediatric pain management of the included units.

The intervention will be a one day seminar for nurses working at the units, with lectures and workshops with main focus on the subjects showing the lowest pediatric pain management competence. In addition, there will be clinical supervision in pediatric postoperative pain management (two or three days per unit). The intervention will be conducted by two experts (nurse and physician) in pediatric postoperative pain management.

After the intervention there will be different reminders every week for the first month, and then every month (in different forms) about pediatric pain management during six months of time.

Study 3 Implementation and Evaluation of the Intervention

Research Questions

Will tailored educational interventions improve nurses' knowledge and attitude to pediatric pain management?

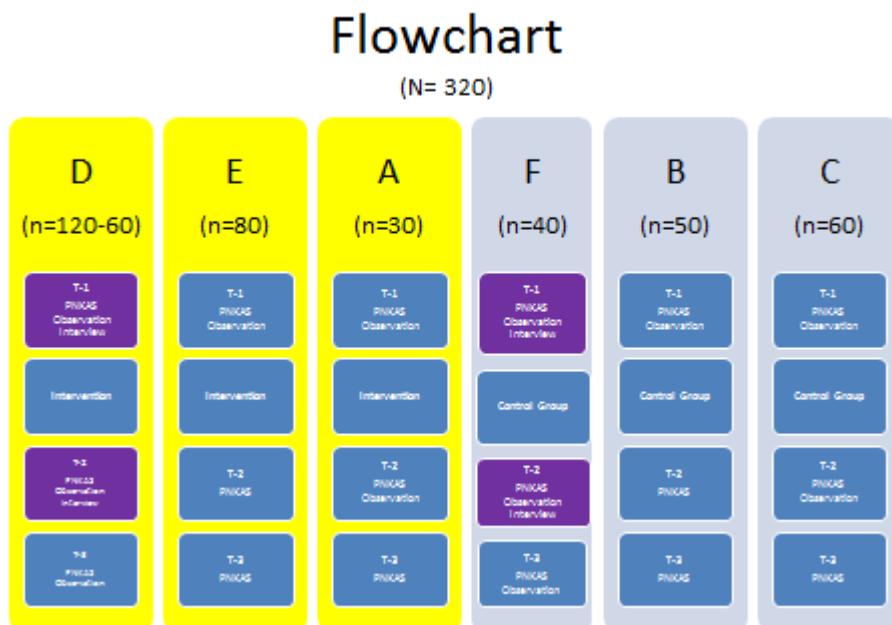
Will tailored educational intervention improve nurses' pediatric pain management practice?

After the educational intervention is implemented there will be different reminders. The first month there will be reminders every week, and thereafter every month for six months period of time. The reminders are based on the general pain management practice, pain assessment, pharmacological and non-pharmacological treatment of pain in children with main focus on the subjects showing the lowest pediatric pain management competence at baseline. The reminders will be in different forms (poster, pamphlet, picture, pocket guide etc.) posted in different places at the units (46).

After the intervention there will be an evaluation of the effectiveness of intervention. To evaluate the intervention three different approaches will be used (questionnaire, observation and interview) to collect data about pediatric pain management practices.

Pre-post tailored educational intervention design, with comparison group, measured during three periods; T-1 (baseline - before intervention), T-2 (one month after intervention) and T-3 (six months after intervention).

Table 2: FLOWCHARTS



Sample/Settings

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Three of these six units will be randomized (cluster randomized by units) in an intervention group and three in a comparison group. Each unit has about 40-60 nurses, approximately 260 nurses in total.

Data Collection

All nurses at all six units are asked to take part in the study by completing the PNKAS-N questionnaire at T-2 and T-3. Non-participant observational studies will be conducted at four units at T-2. Furthermore, one unit from the intervention group and one unit from the comparison group will be randomly chosen for observational studies at T-3. During each data collection period observations will be carried out for four-hour periods, two weeks per unit (40 hours per unit per occasions, 240 hours in total). Children older than six years who are having surgery at the time of data collection at the same two units will be asked to participate in an interview (20 children from two units) at T-2.

Data Analysis

Descriptive and inferential statistics will be used to analyse quantitative data at each data collection. Regression analyses that accounts for repeated measurements and cluster correlations (within units) will be used for comparisons between data collected at baseline T-1, T-2 and T-3. Content analysis will be used to analyse the children's responses to the interview questions. Supplementary data from the interviews and the observation studies at T-1 and T-2 will be compared to see if the tailored educational intervention improve nurses' pediatric pain management practice and childrens experience of pain assessment (e.g. use of pain assessment tools, use of pharmacological and non-pharmacological treatment of pain).

Ethics:

Ethical research guidelines will be followed (47-52). An approval from the Norwegian Social Science Data Services (NSD) and Regional Committee for Medical Research Ethics (REK South-East) will be obtained. Necessary approval from the hospitals will be obtained. Contact will be established with relevant persons at the units and cooperation on the implementation of the project. The project will be personally presented by the project manager at the relevant departments at baseline. A pilot observational study and two pilot interviews with children will be done before baseline (T-1).

Participants (nurses, children and their parents) will receive oral and written information about the study, and informed consents will be obtained from all the participants. The information letter includes information about the study, and explains that it is voluntary to participate in the study and the participants' answers will be treated anonymously (53-57).

The questionnaires will be distributed to the nurses with an information letter and an envelope for returning the questionnaires. Informed consents will be obtained from all the persons (nurses, children and their parents) who are present during the observational studies. The participants who do not approve will be excluded from the study. Informed consents will be obtained from both the children (> 12 years) and the parents that are participating in the interviews. All data will be recorded on standardized forms. The interviews with children will be coded so that no data collected include date of birth or other sensitive information that can identify the child. Data will be stored securely and deleted at the end of the study (58-61).

Benefit/Risk:

Participating in the study will involve some extra work in filling in the questionnaire and to participate in the intervention. Furthermore, the participants may feel uncomfortable being observed during the observational study. They will be informed that no data about any nurses

or others will be available for others. It will also be voluntary to participate. Furthermore, the questionnaires are anonymous. Studying the nurses' knowledge and attitudes to pain in children and adolescents in Norway may lead to increased focus, awareness and attention on the topic among nurses. This means that while taking part in the study will not be of direct benefit to the children participating it may result in improved care for children in the future. The study will summarize Norwegian nurses' knowledge and attitudes to pain in children and adolescents. Further, the study will summarize nurses' use of pain assessment tools and if there are guidelines for pain assessment and treatment of the various units in the all health regions in Norway. The evaluation of the intervention can contribute to development of a national educational program for nurses in relation to post-operative pain and pain management in children and adolescents.

Declaration of Conflicting Interests:

There are no conflicts of interest.

Schedule 2014-2019

Preparation		November 2013 - June 2014	
Data collection	T-1	September - November 2014	PNKAS-N Observation Interview with children
	intervention	January – February 2015	
	T-2	March - April 2015	PNKAS-N Observation Interview with children
	T-3	September- October 2015	PNKAS-N Observastion
Data analysis		September 2015 - March 2017	
Papers	paper 1	December 2015 – March 2017	
	paper 2	April 2016 - March 2017	
	paper 3	October 2016 - November 2017	
	paper 4	October 2016 - November 2017	

Publication Plan:

2016	<p>Nurses knowledge about pediatric postoperative pain management Data from baseline, PNKAS, observasjon (short summar in table) baseline Journal: Pain Management Nursing http://www.painmanagementnursing.org/content/authorinfo (Nurses' pediatric pain management practices in postoperative units in Norway - data will be from the questionnaires at baseline and the observation studies.)</p>
2016	<p>Pain in children after surgery- an interview study Data from T1 Journal: Journal of Clinical Nursing http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1365-2702/homepage/ForAuthors.html</p>
2017	<p>The development of a tailored intervention about pediatric pain management after surgery (Data from baseline interview, baseline observation, PNKAS) Theoretical framework Journal: Scandinavian Journal of Caring Sciences</p>

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	<p>http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1471-6712/homepage/ForAuthors.html (A tailored educational intervention with nurses in pediatric pain management - the content of the intervention will be published were all the details will be given.)</p>
2017	<p>Implementation and evaluation of an intervention about pediatric pain management after surgery Data: Endring fra T1, T2, T3- PNKAS, interview Journal: Pain http://edmgr.ovid.com/pain/accounts/ifauth.htm (Evaluation of a tailored educational intervention with nurses pediatric pain management - the main paper will describe the effect of the intervention. Data from all measurement points will be presented, and data from the interviews and observations will be given as well.)</p>

Even if only three publications will be included in the doctoral thesis, the research group will write the fourth one.

The results from the study will be presented at national as well as international conferences.

Dissemination of the results:

Presentation	Oral	January 2017	National conference Norway NOSF, Oslo http://www.norsksmerteforening.no/kurs
Presentation	Oral	March 2017	National conference Norway Norsk Barnesmerteforenings vårseminar, Oslo http://www.norskbarnesmerteforening.no/arrangementer
Presentation	Oral	April 2017	National conference Norway BSF Vårseminar, Bergen http://www.reiseogkonferanseservice.com/Barnesykepleieforbundet/Varseminar2017/program.cfm
Presentation	Poster	July 2017	International Conference 11th International Symposium on Pediatric Pain (ISPP) Kuala Lumpur, Malaysia http://www.ispp2017.org/abstract

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