

Promoting Children's Pharmacological Post- Operative Pain Alleviation At Home

Päivi Kankkunen
Katri Vehviläinen-
Julkunen
Anna-Maija Pietilä

Anne Korhonen
Sirpa Nyyssönen
Nina-Maarit Lehikoinen
Hannu Kokki

This study evaluated the influence of parental use of Parents' Post-Operative Pain Measure (PPPM) on 1 to 2-year-old children's pharmacological pain alleviation at home. Fifty parents whose child had undergone day surgery in three University Hospitals in Finland between January 2006 and June 2007 completed questionnaires. Parents of the intervention group ($n = 29$) were provided with PPPM as an intervention to promote children's pain relief at home, while parents in the control group ($n = 21$) did not receive the PPPM. The use of PPPM had a positive effect on pain management; total dosing of analgesics was higher in the intervention group on all three study days. However, the difference was not statistically significant. Optimal dosing was provided only for 12% of the children in the intervention group, whereas no children in the control group received optimal dosing. The parents of the intervention group did not consider analgesics to be helpful more often than the parents in the control group. In conclusion, the use of the PPPM may promote parents' management of their child's post-operative pain at home. Larger samples in further studies are needed to verify the findings of this study.

Day surgery is especially common among children because they are described to benefit from it (Lönnqvist & Morton, 2006). An economical benefit may include short stay at the hospital, and day-surgery interrupts family life less than in-patient surgery. This is a challenge for children's post-operative pain management because the responsibility for the effective post-operative pain relief has become a parental duty. Several studies show that children have significant post-operative pain at home (Hamers & Abu-Saad, 2002; Kankkunen, Vehviläinen-Julkunen, Pietilä, & Kiviniemi, 2005; Matziou, Kyritsi, &

Perdikaris, 2004; Sutters et al., 2007; Tuomilehto, Kokki, Ahonen, & Nuutinen, 2002) and that there is a need to improve children's pain management (Zisk, 2003). It has been suggested that parents are able to manage the child's post-operative pain at home appropriately if they are provided with information and instructions about the timing and dosing of analgesia on discharge (Jonas, 2003; Sepponen, Kokki, & Ahonen 1999). Therefore, it is essential that parents are provided with sufficient information, support, and tools to assess and manage their child's pain at home (Bastable & Rushforth, 2005).

It is known that dosing of anal-

gesics is not at an optimal level at home and that all children do not receive pain medication even if parents assess them to have pain post-operatively (Huth & Broome, 2007). Inadequate prescription of medication and insufficient administration of the prescribed medication are considered the main reasons for children's poor pain relief at home (Hamers, Abu-Saad, van den Houten, & Halfens, 1998).

Earlier studies report that several parental factors hinder children's effective pain relief at home after surgery. Parents may expect the child to have pain after surgery (Romsing & Walther-Larsen, 1996), and fathers

Päivi Kankkunen, PhD, RN, is an Adjunct Professor and Senior Lecturer, the University of Kuopio, Department of Nursing Science, Kuopio, Finland.

Katri Vehviläinen-Julkunen, PhD, RN, is a Professor, the University of Kuopio, Department of Nursing Science, Research Unit, Kuopio University Hospital, Kuopio, Finland.

Anna-Maija Pietilä, PhD, RN, is a Professor, the University of Kuopio, Department of Nursing Science, Kuopio, Finland.

Anne Korhonen, PhD, RN, is a Specialist in Clinical Nursing Science, Department of Pediatrics and Adolescence, Department of Otorhinolaryngology, Oulu University Hospital, Oulu, Finland.

Sirpa Nyyssönen, MSc, is Director of Development, Alina Care Team, Ltd., Kuopio, Finland.

Nina-Maarit Lehikoinen, MSc, RN, is a Nurse Manager, Helsinki University Central Hospital, Department of Medicine, Helsinki, Finland.

Hannu Kokki, MD, is an Adjunct Professor and Staff Anesthetist, Department of Anesthesiology and Intensive Care, Kuopio University Hospital, and Department of Pharmacology and Toxicology, the University of Kuopio, Kuopio, Finland.

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Objectives and the
CNE posttest can be
found on pages 304-305.

have highlighted the need to tolerate pain among boys (Kankkunen, Vehviläinen-Julkunen, Pietilä, & Halonen, 2003). Parents fear side effects, consider analgesics as addictive, and think that the less often children receive analgesia, the better it worked (Kankkunen, Vehviläinen-Julkunen, Pietilä, Kokki, & Halonen, 2003; Zisk, Grey, MacLaren, & Kain, 2007). Parents may also believe that children are unable to feel pain or they may consider analgesics to be dangerous for the child (Gedaly-Duff & Ziebarth, 1994; Kankkunen, Vehviläinen-Julkunen, Pietilä, Kokki et al., 2003). Parents' attitudes toward children receiving pain medication are also dependent on the parents' own experiences of surgery (Riddell, Lilley, & Craig, 2004). These unsubstantiated and negative attitudes about children's pain and analgesics explain inadequate use of analgesics in children's post-operative pain management at home (Kankkunen, Vehviläinen-Julkunen, Pietilä, & Kiviniemi, 2005).

Preliminary evidence suggests that the use of the Parents' Post-Operative Pain Measure (PPPM) promotes 1 to 6-year-old children's non-pharmacological pain alleviation at home after surgery. Lehtikoinen (2007) found that the parents who were given the PPPM used several non-pharmacological pain alleviation methods more than parents in the control group. However, no differences in the use of analgesics between the intervention group and the control group of parents were found. Lehtikoinen (2007) studied children ages 1 to 6 years. According to Bonham (1996), children's responses to pain differ during their developmental stages. Children ages 1 to 3 years express their pain mainly by crying, screaming, identifying pain location, and talking aggressively, while older children can describe the intensity of pain. Therefore, it was necessary to explore the influence of the PPPM with children ages 1 to 2 years who express their pain in a similar way.

The purpose of this study was to evaluate the influence of parental use of PPPM on the use of pain medication at home for 1 to 2-year-old children. The research questions were:

- How intensive is children's post-operative pain at home during the day of surgery and on the first two post-operative days?
- Which analgesics do parents give to their children at home?
- How much are analgesics used among the children?
- How does the use of PPPM influ-

ence in the total amount of analgesics and the optimal dose given to the child?

Methods

Sample and Setting

Parents of 100 children scheduled for day surgery in three university hospitals in Finland were invited to participate in the study between January 2006 and June 2007. The parents of 50 children between 1 and 2 years of age agreed to participate, and 50 refused to participate. One parent from each family participated in the study. Convenience sampling was used. The study nurses invited every second consecutive parent whose child had a surgical day case procedure into the intervention ($n = 29$) or control group ($n = 21$). Every parent was asked to participate: first parent to the intervention group, second parent to the control group, third parent to the intervention group, and so on. Sizes of the two groups differ because

participation in the study was voluntary, and parents in the control group refused to participate more often than parents in the intervention group. The study nurses were provided with verbal instructions about how to teach the parents to fill in the questionnaire.

The PPPM was used as an intervention to promote children's pain alleviation in the intervention group. Contact nurses who were acting as research nurses in the day surgery units provided the parents with the questionnaires and instructions on how to complete them. The parents completed the questionnaires on the day of surgery and on the first two post-operative days and returned the questionnaires to the researcher in pre-paid envelopes. Ward staff provided parents with instructions for post-operative pain management according to the standards of each hospital. The instructions were fairly similar in each of three university hospitals, and there were no differences in the use of analgesics between the hospitals. Instructions included information

Table 1.
Children's and Parents' Background Information (%)

Demographic Characteristics	<i>n</i>	%
Child's Age (<i>n</i> = 50)		
12 to 23 months	31	62
24 to 35 months	19	38
Child's Gender (<i>n</i> = 47)		
Girl	12	25
Boy	35	75
Parent's Basic Education (<i>n</i> = 50)		
Elementary school	–	–
Comprehensive school	25	50
Senior high school	25	50
Vocational Education (<i>n</i> = 47)		
Vocational school	9	19
Vocational college	13	28
Polytechnic	14	30
University	10	21
Other	1	2
Type of Surgery (<i>n</i> = 50)		
Eye surgery	5	10
Ear-nose-throat	27	66
Hemiotomy	4	8
Other	14	16

Note: Some parents failed to answer this question.

Table 2.
Variables Measuring Pain-Related Behavioral Changes
in Children Ages 1 to 2 Years

Behavioral Change	No = 0	Yes = 1
The child wants to be close to the parent more than usual.	0	1
The child eats less than usual.	0	1
The child whines or complains more than usual.	0	1
The child cries more easily than usual.	0	1
The child plays less than usual.	0	1
The child acts more cranky than usual.	0	1
The child cries more than usual.	0	1
The child does not let the parent out of his or her sight.	0	1
The child has less energy than usual.	0	1
The child groans and moans more than usual.	0	1
The child acts more quiet than usual.	0	1
The child does not the things he/she normally does.	0	1
The child refuses to eat.	0	1
The child acts more difficult to comfort than usual.	0	1

about timing and dosing the analgesics, and contact information for the surgical ward if any post-operative problems occurred.

Demographic characteristics of the participating parents and children are described in Table 1. The children varied in age, from 1 to 2 years, with the mean age of 22 months. Most of the children were boys, and 84% had no previous surgical procedures. The parents' ages varied between 20 and 44 years (mean 33 years). More than half had completed senior high school; 19% graduated from vocational school (120 European Credit Transfer System [ECTS]), 28% from vocational college (general upper secondary school or vocational institutions and apprenticeship training, 210 ECTS) or polytechnics (Bachelor's degree 3.5 to 4.5 years, 180 to 240 ECTS). Thirty-nine percent of the parents were working in health care. No statistically significant differences were found in the children's and parents' background variables between the intervention and control groups. Thirty-eight percent of the parents had received a prescription for the child's analgesics. Written instructions for pain medication were given to 49% of the parents, and 74% considered the instructions to be sufficient.

Instruments

Altogether, 50 parents participated in the study, and the response rate was 50%. All parents were asked to complete a pain diary consisting of ques-

tionnaires about demographic variables and their child's use of a 5-point verbal pain rating scale (0 = no pain, 1 = mild pain, 2 = moderate pain, 3 = severe pain, and 4 = worst pain you can imagine). Use of analgesics with their child was measured by open-ended questions. Parents in the intervention group were also provided with the Finnish version of the PPPM, which consisted of 14 behavioral changes (see Table 2). They were asked to circle a "0" if the child did not have the behavioral change indicated in the instrument and a "1" if the child had the behavioral change. They assessed the child's pain behaviors throughout the whole day until the child had fallen asleep in the evening.

Research demonstrates that parents have difficulties in identifying and assessing their child's pain (Kankkunen, 2003). Parents can be helped to identify their child's post-operative pain by providing them with pain assessment tools, such as the PPPM, to be used at home. The PPPM consists of pain-related behavioral changes in children (Chambers, Reid, McGrath, & Finley, 1996), and it has been validated for children ages 1 to 6 years (Chambers, Finley, McGrath, & Walsh, 2003; Kokki, Kankkunen, Pietilä, & Vehviläinen-Julkunen, 2003). Further validation with the version of 14 variables showed that the PPPM is a valid instrument to measure pain behaviors in children ages 1 to 2 years (Kankkunen, Vehviläinen-Julkunen, & Pietilä, 2005). Evaluation of 20 obser-

vational pain assessment tools showed that the PPPM can be recommended for parents because of its high validity and reliability (von Baeyer & Spagrud, 2007).

In open-ended questions, all parents were asked to report which analgesic(s) they had given to the child, the dose given, the number of doses, timing of medication, and possible problems and adverse responses during the day of surgery and the next two post-operative days. In addition, the parents assessed the pain relief on a scale (1 = complete pain relief, 2 = moderate, 3 = slight, and 4 = none). Parents were also asked if they had received a prescription for the child's analgesics and instructions for post-operative pain management.

Data Analysis

Data were analyzed by using SPSS for Windows 14.0. Frequencies were used to describe the results. The scores of the PPPM were summarized for each of the three days. Therefore, the values of summarized scores of the PPPM can vary between 0 and 14. A "0" means the child had none of the behavioral changes in the PPPM, and a "14" means the child had all of the behavioral changes included. Total dosing (mg/kg) of each analgesic was summarized per day. Optimal level of dosing per 24 hours was defined as naproxen (10 mg/kg), paracetamol (60 mg/kg), ibuprofen (20 to 40 mg/kg), and ketoprofen (3 to 5 mg/kg) (Lääketietokeskus Oy [Pharmaceutical Information Centre, Ltd, 2007]). Each of these analgesics can be administered orally or rectally. Naproxen requires a prescription in Finland, the site of the study. Cross-tabulation and Chi-square tests were used to compare parental use of analgesics between the intervention and control groups. *P*-values less than 0.05 were considered to be statistically significant. Power analysis was not conducted because of the unknown effect size of parental average use of different analgesics at home. Inductive content analysis was used to analyze responses to the open-ended question concerning problems in administration of analgesics. The responses were first read through and then combined into categories based on their contents.

Study Ethics

Approval to conduct the study was received by the institution's ethics committees (reference 242/E9/05) and administrative physicians in each hospital. The survey was anonymous

Table 3.
Children's Pain Intensity Measured by Verbal Rating Scale (%)

Timing/Pain Ratings	Intervention Group	Control Group	p-value
Day of surgery (n = 48)	n = 29	n = 19	
No pain	14	5	
Mild pain	62	68	
Moderate pain	14	21	
Severe pain	10	6	
Worst possible pain	–	–	
Post-operative Day #1 (n = 46)	n = 29	n = 17	
No pain	59	47	
Mild pain	38	47	
Moderate pain	3	6	
Severe pain	–	–	
Worst possible pain	–	–	
Post-operative Day #2 (n = 47)	n = 28	n = 19	
No pain	64	79	
Mild pain	32	10	
Moderate pain	4	11	
Severe pain	–	–	
Worst possible pain	–	–	ns.

Test: Cross-tabulation and chi square test

and based on voluntary participation. Parents' decision to complete the questionnaire was considered as consent to participate the study, and therefore, no written consent form was used. The study caused no harm to the children.

Results

The Intensity of Children's Postoperative Pain

Two-thirds of the parents reported their child had mild pain, and 25% reported moderate or severe pain on a 5-point verbal rating scale. Children in the intervention group reported more pain during the first and second post-operative days. The differences in children's pain ratings were not statistically significant using the Chi-square test (see Table 3.) The children in the intervention group ($n = 29$) also had their pain measured by the PPPM. On the day of surgery, the PPPM scores varied between 0 and 14, and the mean scoring was 6.1 ($n = 28$, $SD = 4.5$). On the first post-operative day, ratings varied between 0 and 6, with mean value 1.1 ($n = 27$, $SD = 1.7$). Ratings varied between 0 and 8, with

mean value 1.1 ($n = 27$, $SD = 2.1$) during the second post-operative day.

There was a strong ($r = -0.616$ to -0.712), negative correlation between the PPPM scores and verbal pain ratings during each of the days. This may reflect that parents could not assess the child's pain with the verbal pain scale as well as by using the PPPM.

Parents' Use of Analgesics with Their Children

Parents had given naproxen, paracetamol, ibuprofen, and ketoprofen to manage their child's pain. The total number of doses varied between 2 and 8 times during the day of surgery, and between 2 and 6 times during the first and second post-operative day (see Table 4). During the day of surgery, 16% of the parents did not give their child any pain medication. During the two post-operative days, 54% of the parents gave the child no pain medication during the first day, and 48% did not give pain medication during the second post-operative day.

Influence of PPPM on Children's Post-Operative Pain Medication Administration

The total number of doses of anal-

gesics was higher in the intervention group on each of the three days, although the difference was not statistically significant. Dosing of analgesics was at optimal level (as defined earlier) only in the intervention group. Dosing was optimal with 12% of children ($n = 42$) during the day of surgery, 12% ($n = 26$) during the first post-operative day, and 13% ($n = 24$) during the second post-operative day. The differences for each of the three days between children in the two groups were not statistically significant. The children were given analgesics mainly between 2:00 p.m. and 8:00 p.m. during each of the days in both groups, and only children in the intervention group (23%) were medicated during the first post-operative night.

Parents Faced Problems in Administration of Analgesics

Parents described that children refused to take the medication, the volume was too large for the children, and the children stated that the medication tasted bad. Pain relief was complete or good according to 95% of parents in control ($n = 20$) and 87% of parents ($n = 22$) in the intervention group during the day of surgery. During the day of surgery, a parent of one child in the intervention group considered the analgesics to not be helpful at all. Similarly, the same parent stated that analgesics were not helpful during the first post-operative day. The differences between the intervention and control groups were not statistically significant. Thirty-eight percent of parents in this study had received a prescription for analgesics, and 48% of them had received written instructions for pain medication.

Discussion

Results of this study show that in young children experiencing day surgery, post-operative pain is common, and some children may have severe post-operative pain at home after discharge. The results confirm earlier findings (Hamers & Abu-Saad, 2002; Kankkunen, Vehviläinen-Julkunen, Pietilä, Kokki et al., 2003; Lehtikoinen, 2007; Matziou et al., 2004; Sutters et al., 2007; Tuomilehto et al., 2002) and indicate a need for more effective pain management. Children in the intervention group were reported to have more pain during the first and second post-operative days. Although there was not a statistically significant difference in their administration of pain medication, parents who had used the

Table 4.
Dosing of Analgesics Provided for the Child's Post-Operative Pain Management (%)

Medication Dose within Expected Range	Day 0	Day 1	Day 2
Doses in the intervention group (n = 29)			
2	55	40	40
3	18	0	0
4	9	20	20
5	0	20	20
6	9	20	20
8	9	0	0
Doses in the control group (n = 21)			
2	50	0	0
3	17	40	40
4	17	40	40
5	16	20	20
6	0	0	0

PPPM may have been more aware of pain behaviors in their child and were more able to assess the pain.

Findings related to the intensity of post-operative pain demonstrated that the use of pain medication to manage children's pain remains low. Parents used analgesics that are considered to be effective in children's post-operative pain relief (Kokki, 2006). However, even for those giving pain medications, most parents gave the child inadequate analgesic doses; dosing was optimal only with 13% of the children and only in children of the intervention group.

Earlier studies also describe inadequate use of analgesics (Kankkunen, Vehviläinen-Julkunen, Pietilä, Kokki et al., 2003), and one reason is found to be insufficient discharge instructions (Kankkunen, Vehviläinen-Julkunen, Pietilä et al., 2005). Surprisingly, only 38% of parents in this study had received a prescription for analgesics, and less than half had received written instructions for pain medication. Findings indicate a need for more effective parental education when the child is undergoing surgery (Sepponen et al., 1999).

Use of the PPPM appears to have influenced parental administration of analgesics with their children at home. Total dosing of analgesics was higher in the intervention group on each of the three days. In addition, only parents of the intervention group gave their child more than six doses. Parents in the intervention group

reported being less satisfied with the child's pain relief, which may indicate that they were more aware of the need to assess and alleviate their child's pain. It is also possible that parental beliefs of underlying attitudes toward analgesics had some influence on their perceptions of the helpfulness of pain medication for their children after surgery (Riddell et al., 2004).

Study Limitations

There were several limitations to this study. Study nurses were trained in providing instructions to parents regarding how to complete the questionnaire and may have given them different guidelines. Based on the study design, minor differences in discharge instructions parents received may have influenced the study findings. The low response rate (50%) indicates that the questionnaire measuring the child's pain behaviors and parental use of pain medication may have been difficult to complete, and the results cannot be generalized beyond the target population. In addition, the differences of the findings in the intervention and control groups were not statistically significant, but may be due to the small sample size. Differences in administration of analgesics may be based on some other phenomenon than the use of the PPPM. It is possible that several factors, such as differences in hospital education, low numbers of prescriptions provided, and many parents not receiving any written instructions,

influenced findings. However, parents' background information details were similar in both groups, and thus, it can be assumed that the differences were based on parental use of the PPPM. In addition, there were no statistically significant differences in parents' analgesics administration practices, whether or not the parents had received a prescription, and whether or not they had received written instructions.

Implications for Research And Nursing Practice

The findings of this preliminary study provide challenges for further research. The influence of the PPPM on parents' use of post-operative pain medication with their children should be explored using larger samples. In addition, a randomized control trial could be implemented in further studies.

The findings of this study can be used in nursing practice with parents whose child is undergoing day surgery. The nurses could provide the parents with the PPPM to help them to identify and assess the child's pain at home.

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