ORIGINAL PAPER

Promoting Parents' Use Of Non-Pharmacological Methods And Assessment Of Children's Postoperative Pain At Home

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ABSTRACT

Background: Parents have reported challenges in assessing their child's postoperative pain at home.

Aims: The purpose of this study was to evaluate the usefulness of the parental use of the Parents' Postoperative Pain Measure -tool (PPPM) on 1-3 -year-old children's non-pharmacological pain alleviation at home.

Methodology: This was a non-randomized, prospective study with two parallel groups, where the parents in the intervention group were provided with PPPM in addition to a pain diary consisting of a verbal pain scale. The data were collected from 50 parents whose children had undergone day surgery in three Finnish university hospitals between January 2006 and June 2007. Parents completed questionnaires consisting of background information, verbal pain rating scale and a sub-scale measuring parents' use of non-pharmacological methods in children's postoperative pain alleviation.

Results: Most children had mild postoperative pain after discharge, but in some children pain was moderate or severe. Non-pharmacological interventions were used commonly for pain alleviation in both groups, including holding the child in lap, comforting the child and spending time with the child more than usual during the recovery period after discharge. However, the use of non-pharmacological pain alleviation methods was 15% more common in the intervention group than in the control group. Parents of the intervention group had carried the child ($p=0.04$) and used distraction ($p=0.05$) more commonly than parents in control group. No group differences were found in parental assessments of the helpfulness of non-pharmacological pain alleviation methods.

Conclusions: Children's pain remains under-treated and their pain alleviation can be promoted by providing the parents pain assessment tools, such as PPPM, to be used at home. The results can be utilized to further improve children's pain alleviation. More parental education is needed to promote their skills to alleviate the child's pain. Further research of the usefulness of the PPPM using larger samples is needed.

Key words: child, postoperative pain, parents, non-pharmacological methods, PPPM, quasi-experimental design

BACKGROUND

Children's pain has been the focus of research widely. Studies have addressed physiologic, pharmacologic, ethical and psychological aspects of children's pain. Despite advances in the past decade, there is still a need to improve children's pain management (Zisk 2003.) Several studies have shown that children suffer from significant pain after day surgery (e.g. Tuomilehto et al. 2002, Hamers & Abu-Saad 2002, Kankkunen et al. 2003, Matziou, Kyritsi & Perdikaris 2004, Sutters et al. 2007), such as tonsillectomy, adenoidectomy and herniotomy. Postoperative pain is often more severe and last longer than expected (Sutters et al. 2007). In a recent report all children had postoperative pain during three days after surgery. Most of them had several pain behaviors, such as maintaining a certain position, in-drawn limbs and keeping eyes shut (Matziou, Kyritsi & Perdikaris 2004).

Children's postoperative pharmacological pain management can be promoted by effective use of non-pharmacological methods (see e.g. Kankkunen 2003, He 2006). These methods consist of several approaches to relieve pain without using drugs and their usefulness is based on pain mechanisms. They may enhance activity in descending inhibitory systems as described in the gate control theory (e.g. He 2006). The methods are simple to use, require minimum education or equipments, and, therefore can easily be used by the parents (Turner 2005). They are effective in reducing pain in children (Sinha et al. 2006, Pölkki et al. 2007). These methods can promote children's sense of control of the painful situation (Salanterä et al. 2006), and they work also by focusing the child's attention away from pain. Non-pharmacological methods include cognitive-behavioral and physical methods, emotional support, helping in daily activities and creating a comfortable environment (Pölkki 2002).

Fairly little is known of parents' use of non-pharmacological methods to manage their child's postoperative pain at home after day surgery. According to earlier studies (Pölkki et al. 2005, 2007, Huth, Broome & Good 2004) imagery is used by the parents, and it has proved to be effective to reduce children's pain. In addition, distraction was found to reduce children's fear and distress (Windich-Biermeier et al. 2007). Parents have also described use of emotional support and helping in daily activities (Pölkki 2002, Kankkunen et al. 2003, He et al. 2005), while the use of cognitive-behavioral and physical methods remained limited. Earlier studies have been mainly descriptive, and no intervention studies in this age group (1 to 3 years) of promoting children's postoperative pain alleviation by using non-pharmacological methods were found in the literature search.

Several factors may hinder effective use of non-pharmacological pain alleviation methods. Parents lack knowledge of non-pharmacological pain alleviation methods (He et al. 2005), which indicate need for more effective parental education during children's hospitalization. However, discharge can be facilitated by clear instructions regarding continuing pain control (Lönnqvist & Morton 2006). In addition, parents have considered discharge instructions to be insufficient, and insufficiency of instructions was directly related to ineffective use of non-pharmacological pain alleviation methods (Kankkunen et al. 2003). Similarly, parents' incorrect perceptions of children's pain were one of predictors to children's poor pain relief at home (Kankkunen et al. 2005).

The parents have also described that they cannot identify and assess the child's pain in a reliable way (Kankkunen 2003). The parents can be facilitated to identify their child's postoperative pain by providing them with pain assessment tools, such as the Parents' Postoperative Pain Measure (PPPM) to be used at home.

The PPPM consists of pain-related behavioral changes in children (Chambers et al. 1996), and it has been validated for children aged 1 to 6 years (Chambers et al. 2003, Kokki et al. 2003). One preliminary study (Lehikoinen 2007) showed that parents of 1-6 -year-old children used more non-pharmacological pain alleviation methods compared to the parents in the control group if they were provided with the PPPM. However, there were no differences in use of analgesics between the intervention group (received PPPM) and the control group (did not receive PPPM).

The purpose of this study was to evaluate the usefulness of providing PPPM to parents of 1-3 -year-old children in their use of non-pharmacological methods after discharge. The hypothesis was that the use of the PPPM may promote parental use of non-pharmacological methods in the child's pain alleviation. Research questions were:

1) How intensive was children's postoperative pain measured by verbal rating scale during the three postoperative days?
2) What were the differences in children's pain intensity during the three postoperative days in intervention and control groups?
3) Which non-pharmacological methods were used by the parents in children's postoperative pain alleviation?
4) Does the use of PPPM increase the frequency of parental use of non-pharmacological methods for their children?
5) How helpful did the parents consider non-pharmacological methods in children's pain alleviation?

Study design and data collection

A non-randomized prospective study design with two parallel groups was used (Figure 1). Every second parent whose child had a surgical day case procedure was consecutively included into the intervention (n=29) or control (n=21) group. Contact nurses in the day surgery units provided altogether 100 parents with the questionnaires and instructions how to complete it. The parents completed the questionnaires during the day of surgery (day 0) and on the following two days (day 1 and day 2) at home. The questionnaires were returned to the researcher in pre-paid envelopes. At discharge the parents were provided with instructions of postoperative pain management by the ward staff. However, the nurses were guided not to provide any education of how to use non-pharmacological methods to the parents, and the nurses instructions to the parents focused mainly on the use of the PPPM.

Study ethics

The study was approved by ethics committee (reference 242/E9/05) and administrative physicians in each hospital. Parents' decision to complete the questionnaire was considered as consent to participate in the study. The survey was anonymous and based on voluntary participation. The study did not cause any harm to the children, but hopefully raised parents' consciousness of children's pain management.

Data analysis

Frequencies, means and standard deviations were used to describe the intensity of children pain measured by the verbal rating scale. The scores of the PPPM and the sub-scale measuring parents' use of non-pharmacological pain alleviation methods were summed for each of the three days. Thus, the values of summed scores of the PPPM can vary between 0 and 14, and the values of the sub-scale of non-pharmacological methods between 0 and 20. Cross-tabulation and chi square test were used to compare group differences in parental use of each non-pharmacological method, and Mann-Whitney U-test was used to compare means of the verbal pain ratings, summed PPPM ratings and summed number of non-pharmacological methods in the intervention and control groups (Burns & Grove 2001). Repeated tests of ANOVA were used to measure the changes in means of pain scores by verbal pain scale. Differences in the background information between the groups and increase in the use

of non-pharmacological methods were considered statistically significant with the p-value lower than 0.05. Only statistically significant p-values are reported in this article and p-values higher than 0.05 are reported as "ns = non-significant".

RESULTS

Description of the participants

The parents' age varied between 20 and 44 years with a mean age of 33 years. More than half (52 %) of them graduated from senior high school (Table 1). Forty-three percent of parents worked in social and health care, 16 % at fields of education and business, 12 % were farmers or working at restaurants and about one quarter were private entrepreneurs. The distributions did not differ significantly between the groups. Seven percents of the parents in the intervention group had not received any instructions for their child's postoperative pain alleviation, and more than 70 % of parents in the intervention group considered the instructions to be insufficient. There were no statistically significant differences in children's and parents' background variables in both groups. In addition, all of university hospitals were similar, providing specialized health care in children's day surgery units.

The intensity of children's postoperative pain

Mean ratings of pain measured by verbal rating scale in the whole sample were 1.2 (SD 0.8) during the day of surgery, 0.5 (SD 0.6) during the first postoperative day, and 0.4 (SD 0.6) during the second postoperative day indicating no pain or mild pain for most children. Differences in pain scores between days were statistically significant (p=0.000 for each day). No differences between children in the intervention or control group were found in mean scores of the verbal pain scale. One fourth of the children had moderate or severe pain during the day of surgery. Based on repeated tests of ANOVA the pain intensity was assessed to be less day by day in both groups. Children in the control group had more moderate pain intensity during each of the study days but the difference was not statistically significant. (Table 2.)

Table 1. Children's and parents' background information (%).

Background information	Intervention group	Control group	p-value
Child data			
Age (n=50)			
12-23 months	69	52	
24-35 months	32	48	ns
Gender (n= 47)			
Girl	22	30	
Boy	78	70	
			ns
Type of surg (n=50)			
Eye surgery	10	10	
Ear-nose-throat	62	72	
Herniotomy	14	-	
Other	14	19	
			ns
Parent who filled in the questionnaire			
Gender (n=50)			
Female	93	100	
Male	7	-	
Basic education (n=50)			
Elementary school	-	-	
Comprehensive school	48	52	
Senior high school	52	48	
Vocational education (n= 47)			
Vocational school	19	20	
Vocational College	33	20	
Polytechnic	26	35	
University	19	25	
Other	4	0	

Table 2. Items of the PPPM measuring children's postoperative behavioral changes.

The child wants to be close to me more than usual
The child eats less than usual
The child whines or complains more than usual
The child cries more than usual
The child plays less than usual
The child acts crankier than usual
The child cries more easily than usual
The child doesn't let me out of her/his sight
The child has less energy than usual
The child moans more than usual
The child is more quiet than usual
The child doesn't do things s/he normally does
The child refuses to eat
The child acts more difficult to comfort than usual

Pain ratings among children in the intervention group measured using the PPPM varied between 0 and 14 and the mean scoring was 6.1 (n=28, SD=4.5) during the day of surgery. Ratings varied between 0 and 6 with mean value 1.1 (n=27, SD=1.7) during the first postoperative day, and between 0 and 8 with mean value 1.1 (n=27, SD=2.1) during the second postoperative day. Differences in mean PPPM scores between day 1 and 2, 2 and 3 and 1 and 3 were statistically significant (p=0.000, 0.003 and 0.014).

Use of non-pharmacological methods

There were no statistically significant differences in the mean number of methods the parents had used in the intervention and control group. However, in total the parents in the intervention group used 15% more non-pharmacological pain alleviation methods than the parents in the control group. The number of non-pharmacological pain alleviation methods in total study sample varied between 0 to 15 with the mean number of 6. 6 (n=47, SD=3.2) during the day of surgery. Number of methods used

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	-	-	ns
1. postoperative day (n=46)	N=29	N=17	
No pain	58	47	
Mild pain	38	47	
Moderate pain	4	6	
Severe pain	-	-	
Worst possible pain	-	-	ns
2. postoperative day (n=47)	N=28	N=19	
No pain	64	79	
Mild pain	32	10	
Moderate pain	4	11	
Severe pain	-	-	
Worst possible pain	-	-	ns

by parents (n=45) was between 0 and 11 (mean=3.9, SD=3.2) during the first postoperative day and between 0 and 14 (n=46, mean=2.6, SD=3.6) during the second postoperative day. Differences in the number of non-pharmacological methods used each day were statistically significant (p=0.000 for each day).

The most commonly used non-pharmacological pain alleviation methods in both groups were holding the child in lap, comforting the child, spending time with the child more than usual and, cuddling the child, limiting boisterous play, keeping the child in house, and reading to the child. There were some differences between the two groups; during the day of surgery the parents of the intervention group used more carrying the child (p=0.04) and distraction (p=0.05) than the parents in the control group. In

general, parents used non-pharmacological methods more often during the day of surgery compared to the other days (Table 4).

Parents' assessments of the helpfulness on the non-pharmacological methods

The parents assessed the helpfulness of non-pharmacological methods on a 4-point scale 1= complete pain relief, 2= moderate pain relief, 3= slight pain relief, and 4= no pain relief. During the day of surgery all parents in both groups considered non-pharmacological methods to be helpful in the child's pain alleviation; two thirds considered pain relief to be moderate, one fifth described that the methods had totally relieved the pain and 16 % thought that these methods had provided a slight pain alleviation. Similarly, non-pharmacological methods were considered useful during the first and second postoperative days, and the parents described that the methods had either relieved the pain completely or alleviated it significantly. No group differences were found in parental assessments of the helpfulness of non-pharmacological pain alleviation methods.

DISCUSSION

Discussion of the findings

The purpose of this study was to evaluate the usefulness of providing PPPM to parents of 1-3 -year-old children in their use of non-pharmacological methods after discharge. The hypothesis was that the use of the PPPM may promote parental use of non-pharmacological methods in the child's pain alleviation. Based on this data it is not possible to make a decision with confidence. Pain scores and parental use of non-pharmacological methods did not differ significantly between the intervention group and the control group.

Earlier findings indicate that children's postoperative pain is poorly managed after discharge (e.g. Tuomilehto et al. 2002, Hamers & Abu-Saad 2002, Kankkunen et al. 2003, Matziou, Kyritsi & Perdikaris 2004, Lehikoinen 2007, Sutters et al. 2007). Our findings show that most children had just mild pain after discharge while only some children had moderate or severe postoperative pain at home assessed by both verbal rating scale and the PPPM. However, it is possible that parents tend to underestimate the child's pain, because it has been shown that parents tend to score postoperative pain higher in older children than in toddlers (Sepponen, Ahonen & Kokki 1998).

As found in an earlier study (Kankkunen et al. 2003) parents used mainly emotional methods, such as holding the child in lap, comforting the child, carrying the child and spending time with the child during the day of surgery. Emotional support can be easily implemented by the parents, and it is also possible that these methods are a normal part of parenting the child during the postoperative period. Physical methods, such as positioning and massage were not used with the children as often as emotional support. This may be due to insufficient parental education at hospital. On the other hand, physical methods and imagery are widely used with older, school-aged children and emotional methods are considered more suitable for younger children.

It is also possible that parents' attitudes toward children's pain may have had influence on their limited use of several non-pharmacological pain alleviation methods. Earlier studies from Finland, (e.g. Kankkunen 2003, Kankkunen et al. 2005) show that Finnish parents have several incorrect perceptions of children's pain. For example, the parents thought that children can tolerate pain well and they do not feel pain at all. Similarly especially fathers wanted their sons to learn to tolerate pain and boys' postoperative pain was not alleviated as often than pain in girls (Kankkunen et al. 2005).

The parental use of the PPPM at home increased their use of non-pharmacological methods to alleviate children's pain. Parents of the intervention group used some methods, such as carrying the child and distraction

more than parents in control group (see also Lehikoinen 2007). Although several methods were used more often by parents in the control group, in general the use of non-pharmacological methods was more common in the intervention group than in the control group. Based on this data, it can be stated that the use of the PPPM may assist the parents to identify their child's pain, and, therefore would promote children's pain relief at home. However, using larger samples could provide more significant differences between intervention and control groups.

The parents considered non-pharmacological methods to be helpful in children's pain relief. Also nurses have described that they provide parents with information about distraction, positive reinforcement, comforting, positioning and relaxation (He et al. 2005). Earlier findings from Finland state that Finnish parents have lack of parental education related to effective use of non-pharmacological pain alleviation methods (Lehikoinen 2007). In this study no educational intervention of non-pharmacological pain alleviation methods was used and, therefore, it is possible that parental lack of knowledge had impact on their limited use of these methods.

Study limitations

Validity of the study was improved by using instruments that have been earlier tested in Finnish samples (Kokki et al. 2003). In addition, the parents were instructed how to complete the questionnaire by the hospital staff. However, because of the study design and data collection conducted in three hospitals, it is possible that parents did not receive similar guidance for children's postoperative pain alleviation because there were no standard discharge instructions in Finland, and staffs in each hospital used their own guidelines. It is not known if or how the nurses guided the parents in use of non-pharmacological methods in these three hospitals.
The sample size may have influenced on the findings. Several methods were used more often by the parents in the intervention group, but due to the small sample the results show no significances. Additionally, the response rate of 50 % limits the generalization of the findings. Power analysis would have strengthened the study design. On the other hand, limiting the child's age to 1-3 years increases the validity because pain behaviors are different in older children. In addition, parental use of analgesics may have had some impact on the findings. The response rate was lower in the control group which may indicate that they did not receive sufficient instructions on how to fill in the questionnaire. It is possible that nurses provided more information to those parents who were supposed to use the PPPM. In addition, no information of the non-participants is available because they did not send the questionnaires back to the researchers.

Conclusions

Children had postoperative pain at home especially during the day of surgery measured both by the verbal rating scale and the PPPM Pain scorings. The parents used several non-pharmacological methods to alleviate the pain. Some methods were used more often in the intervention group but the differences in number of the methods they had used and in children's pain scorings were not statistically significant. Further studies with bigger sample size focusing on parental use of one selected non-pharmacological methods instead of the overall use is needed to verify the effectiveness of the PPPM in children's postoperative pain alleviation at home.

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Figure 1

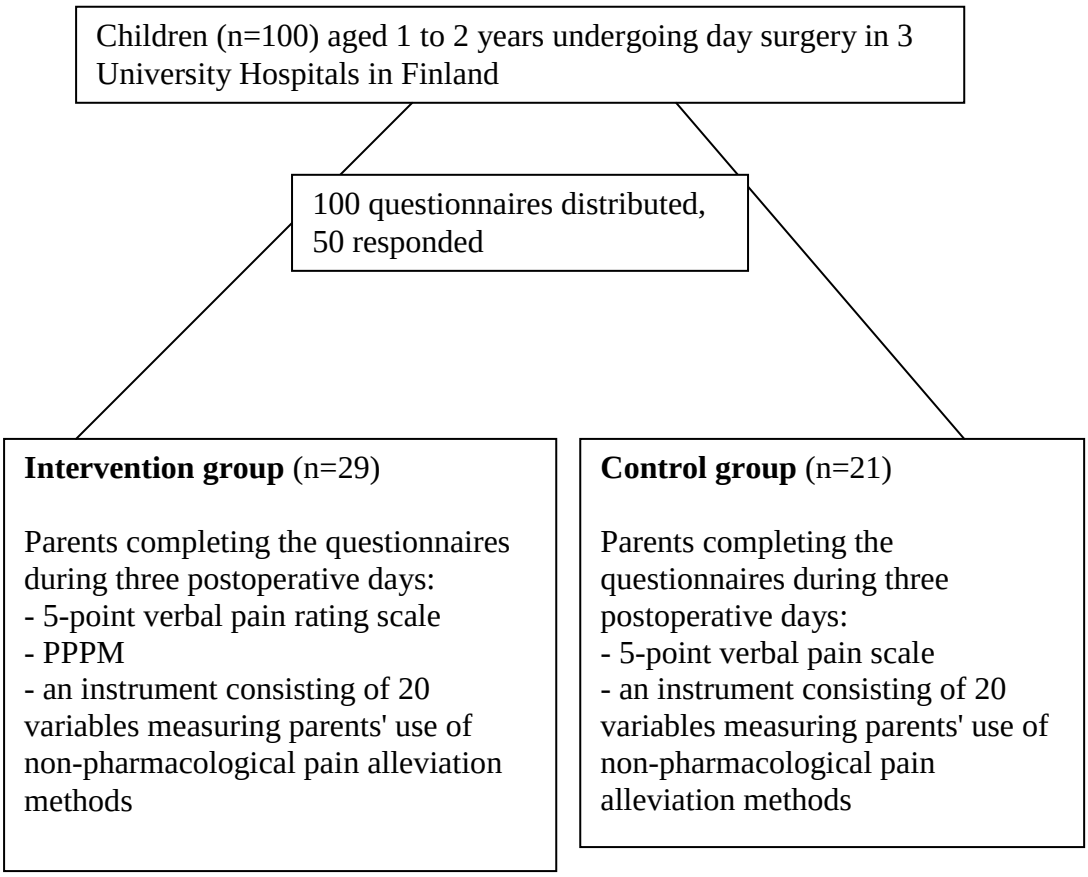

Table 3. Parents' use of non-pharmacological pain alleviation methods in intervention and control groups (n=48, %).

Non-pharmacological method	Day 1	p-value	Day 2	p-value	Day 3	p-value
Holding the child in lap						
Intervention group	86		59		43	
Control group	75	ns	39	ns	25	ns
Comforting the child						
Intervention group	79		38		29	
Control group	75	ns	22	ns	15	ns
Carrying the child						
Intervention group	79		21		14	
Control group	50	**0.04**	11	ns	10	ns
Spending time with the child more than usual						
Intervention group	57		35		32	
Control group	70	ns	33	ns	30	ns
Distraction						
Intervention group	54		17		19	
Control group	25	**0.05**	11	ns	5	ns
Cuddling the child						
Intervention group	50		24		29	
Control group	30	ns	11	ns	10	ns
Limiting boisterous play						
Intervention group	43		35		29	
Control group	40	ns	39	ns	30	ns
Taking the child to sleep in parent's bed						
Intervention group	39		17		18	
Control group	20	ns	17	ns	5	ns
Keeping the child inside the house						
Intervention group	39		24		21	
Control group	50	ns	33	ns	15	ns
Reading to the child						
Intervention group	36		24		29	
Control group	35	ns	33	ns	20	ns
Feeding the child their favorite foods						
Intervention group	32		28		25	
Control group	30	ns	33	ns	15	ns
Providing "treats" more than usual						
Intervention group	29		21		11	
Control group	15	ns	6	ns	15	ns
Avoiding situations where the child would cry						
Intervention group	21		17		14	
Control group	35	ns	22	ns	5	ns
Helping in daily activities						
Intervention group	18		10		14	
Control group	10	ns	6	ns	-	ns
Using other cutlery than usual						
Intervention group	7		3		-	
Control group	5	ns	0	ns	-	ns
Positioning						
Intervention group	4		-		7	
Control group	15	ns	11	ns	10	ns

Massage						
Intervention group	4		-		4	
Control group	-	ns	-	ns	-	ns
Kissing it better						
Intervention group	4		-		-	
Control group	10	ns	-	ns	10	ns
Listening to music						
Intervention group	-		14		4	
Control group	5	ns	6	ns	-	ns
Proving the child natural health products						
Intervention group	-		3		-	
Control group	-		6	ns	-	ns

Day 0= day of surgery, day 1= first postoperative day, day 2= second postoperative day
ns = non-significant