


# Experience and Management of the Adverse Effects of Analgesics After Surgery: A Pediatric Patient Perspective

Journal of Patient Experience  
Volume 9: 1-7  
© The Author(s) 2022  
Article reuse guidelines:  
sagepub.com/journals-permissions  
DOI: 10.1177/23743735221092632  
journals.sagepub.com/home/jpx  


Mandy M. J. Li, BSc<sup>1,2</sup>, Cynthia L. Larche, BSc<sup>2</sup>, Kelsey Vickers, BSc<sup>2</sup>, Marie Vigouroux, PhD<sup>1,3</sup> , Pablo M. Ingelmo, MD<sup>1,3</sup>, Richard Hovey, PhD<sup>1</sup> , and Catherine E. Ferland, PhD<sup>1,2,3,4,5</sup> 

## Abstract

After surgery, the adverse effects (AEs) of analgesics are common and critical factors influencing the postoperative experience of pediatric patients. Inadequate management of AEs has been found to prolong hospital stay, increase readmission rates and decrease satisfaction with care. The aim of this qualitative descriptive study was to better understand the AEs of analgesics from the perspective of adolescent patients with idiopathic scoliosis after spinal surgery. A total of 7 patients participated in the study. Semistructured interviews were conducted at discharge and 1 week after discharge. Transcribed data were analyzed using qualitative content analysis and themes were identified. Overall, participants most frequently reported gastrointestinal and cognitive AEs, with constipation being the most persistent and bothersome. The pediatric participants used a combination of 3 strategies to mitigate analgesic AEs, namely pharmacologic, nonpharmacologic, and reduction of analgesic intake. Participants demonstrated a lack of understanding of AEs and involvement in their own care. Future studies should be conducted to evaluate the efficacy of nonpharmacological strategies in managing analgesic AEs for pediatric patients after surgery.

## Keywords

pediatrics, patient perspectives/narratives, adverse effects, analgesia, postoperative pain

## Introduction

The adverse effects (AEs) of analgesics administered after surgery play a crucial role in the postoperative experience of pediatric patients. Analgesics frequently prescribed for the treatment of postoperative pain include opioids, acetaminophen, and nonsteroidal anti-inflammatory drugs (NSAIDs) (1). Commonly experienced AEs of such analgesics include sedation, nausea and vomiting, abdominal discomfort, constipation, pruritus, respiratory depression, and urinary retention (1–3). Importantly, inadequate AE management may delay discharge and increase the likelihood of hospital readmission (3). Overall, analgesic AEs impact patients' postoperative experience and lower their satisfaction with care (4). Despite the impact of AEs on the postoperative period, current management of AEs is primarily limited to pharmacological strategies (2,3).

A recent review by Chabot and Ferland (5) revealed a paucity of literature regarding the experience of postoperative analgesic AEs from the perspective of pediatric patients themselves. To the best of our knowledge, only 1 study has considered the experience of AEs from the viewpoint of pediatric patients, as evaluated by a qualitative, semistructured

questionnaire (6). This study, however, only considered levels of nausea and findings were confounded by the perspective of caregivers.

This qualitative descriptive (QD) study, therefore, aimed to better understand the AEs of analgesics from the unique perspective of adolescents with idiopathic scoliosis (AIS) after spinal surgery. A qualitative evaluation of the experience of young postoperative patients themselves may guide health care providers in the improvement of analgesic AE management and postoperative patient experience.

<sup>1</sup> McGill University, Montreal, Canada

<sup>2</sup> Shriners Hospitals for Children-Canada, Montreal, Canada

<sup>3</sup> Chronic Pain Services, Montreal Children's Hospital, Montreal, Canada

<sup>4</sup> Integrated Program in Neurosciences, McGill University, Montreal, Canada

<sup>5</sup> Research Institute-McGill University Health Centre, Montreal, Canada

## Corresponding Author:

Catherine E. Ferland, Shriners Hospitals for Children, Boul. Décarie, Montréal, H4A 0A9, Canada.

Email: catherine.ferland@mcgill.ca



## Methodology

### Study Design

A QD design was chosen to describe the experiences of pediatric participants with AEs of analgesic medication in the postoperative period. This approach allowed the researchers to obtain a rich, straight description of participants' experiences (7). A QD design was thus appropriate for generating insights on a topic with a lack of existing research from a patient perspective.

### Study Participants

Patients (10-18 years of age) were recruited from the Shriners Hospitals for Children-Canada between December 2019 and March 2020. A purposive sampling strategy was employed. Preselected criteria included pediatric patients with AIS scheduled for posterior spinal fusion surgery with instrumentation, who could understand and respond to outcome measures in either English or French. Patients with previous major surgery and those diagnosed with a major chronic medical condition (American Society of Anesthesiology status III or higher) were excluded. Prior to the beginning of the study, written informed consent of the patient was obtained. For patients under 14 years of age, written informed consent of a parent or legal guardian was obtained. Participants were assigned an identification code to maintain anonymity. Nine patients were approached to participate in the study. Eight patients consented, while 1 patient declined. Of the 8 patients who consented to participate, 1 participant withdrew due to an adverse event following surgery unrelated to the study. The final analysis included a total of 7 participants. The number of participants is sufficient for rich QD analyses which can establish a foundation for future research on these topics (8,9).

**Table 1.** Descriptive Statistics of Demographic and Perioperative Variables of Study Participants (n = 7).

Patient characteristics	Total patient sample
<b>Demographics</b>	
Age, years	15.4 (3.8)
<b>Sex, n (%)</b>	
Female	4 (57)
Male	3 (43)
<b>Surgical variables</b>	
Surgery length, minutes	191.5 (25.0)
Blood loss, mL	725.0 (450.0)
Number of fused vertebrae	10 (2)
Complications	0 (0)
<b>Postoperative variables</b>	
PCA use, hours	45.0 (23.3)
Morphine, n (%)	3 (43)
Morphine/ketamine, n (%)	3 (43)
Hydromorphone/ketamine, n (%)	1 (14)
Length of hospitalization, days	7.0 (0)

Data are presented as median (interquartile range) unless otherwise stated. PCA, patient-controlled analgesia.

### Data Collection

Study variables were assessed on the day of discharge from the hospital (typically on postoperative day (POD) 5) and 1 week after discharge. A research assistant conducted semi-structured interviews at both time points. Research assistants also collected information from the electronic medical record, including demographics, medical history, surgical variables, duration of hospital stay, and analgesia prescribed after surgery. No change to the standard of care occurred due to study participation.

### Semi-Structured Interviews

An interview guide was followed during the semistructured interviews. Questions assessed patients' experience and management of AEs, involvement of health care professionals in analgesic treatment, and patients' expectations of follow-up. The questions asked were sufficiently open that most informant responses could not be predicted and that follow-up questions could not be planned. The open-ended nature of the questions is a major advantage of semistructured interviews as it allows the interviewer and interviewee to delve further into a topic and explore an idea in greater detail. Upon discharge, patients were asked to detail their analgesic use prior to surgery. During the following interview, patients were asked to describe any analgesic use since their hospital discharge. Each interview lasted approximately 15 min and was audio-recorded.

### Perioperative Anesthesia Care

Perioperative analgesia was standardized, in accordance with an institutional, intraoperative anesthesia protocol specific to the pediatric posterior spinal fusion surgical procedure. All patients received total intravenous (IV) anesthesia including propofol, remifentanyl/sufentanyl/fentanyl, ketamine, and dexamethasone. As per our institutional standard of care, after induction, all patients received an intrathecal injection of morphine. Upon arrival to the post-anesthesia care unit, all patients received IV patient-controlled analgesia (PCA) morphine/ketamine, hydromorphone/ketamine, or morphine. All patients received regular acetaminophen and ketorolac.

### Data Analysis

Interview audio-recordings were transcribed verbatim and French transcripts were translated to English. A second research assistant verified the accuracy of the translations. Transcribed data were analyzed using qualitative content analysis. Rigor was enhanced using strategies proposed by Milne and Oberle (10). Transcripts were read multiple times by the research team to gain a comprehensive understanding of the interviews. Relevant phrases and keywords were highlighted and coded. Emergent themes were developed through regular collaborative meetings with the

research team until a list of major themes and exemplary quotes were compiled (7). Findings were discussed with a pair of experienced qualitative researchers to further ensure confirmability of content analysis. Patient demographic and clinical characteristics were summarized by means for continuous data and by proportions for categorical data.

## Results

### Participant and Surgical Characteristics

The final sample consisted of 7 participants ranging from 12 to 17 years of age (Table 1). Two individuals reported comorbid chronic musculoskeletal pain and syringomyelia. Prior to surgery, 3 participants were taking nonopioid medications for pain, namely ibuprofen and combination acetaminophen, and methocarbamol. No participants reported opioid use. All participants received PCA after surgery that was discontinued on either POD2 (n = 4) or POD3 (n = 3). Additional analgesics administered postoperatively are presented in Table 2. On discharge, participants were prescribed morphine (n = 6), hydromorphone (n = 1), acetaminophen (n = 7), ibuprofen (n = 6), cyclobenzaprine (n = 1) and Lax-A-Day (n = 7).

### Findings

**Management of Adverse Effects.** When asked to describe their experience of analgesic AEs, participants predominantly reported cognitive and gastrointestinal (GI) disturbances (Table 3). Through qualitative content analysis of the interviews, we found that participants used a combination of 3 strategies to mitigate the unwanted effects of analgesics (Table 4).

The use of medications was the most commonly described method. When asked if they still had constipation 1 week after discharge, Participant 2 stated:

No, not really because I took a laxative so I can go to the bathroom.

In fact, all participants who experienced constipation (the most frequent AE both in-hospital and after discharge) reported pharmacologic management of the AE. Moreover, apart from 1 participant, pharmacological management was

**Table 2.** Non-Patient-Controlled Analgesia in-Hospital Analgesics Used by Study Participants (n = 7).

Medication	Use in-hospital, n (%)
Morphine	6 (86)
Hydromorphone	1 (14)
Clonidine	3 (43)
Ketorolac	7 (100)
Ibuprofen	5 (71)
Acetaminophen	7 (100)

generally effective at reducing AEs. Participants had good insight into this as demonstrated above and by Participant 6:

Participant 6: (...) the nausea was a bit [bothersome] but then they had medication for that to help.

Researcher: Did the medication help?

Participant 6: Yeah.

As all patients are prescribed medications postoperatively in anticipation of GI AEs, participants by default had greater access to this management strategy. Furthermore, because GI AEs appeared to be the most bothersome AE, patients were more likely to report the AE to health care providers:

Researcher: Which [AE] bothered you the most, of the effects that you experienced?

Participant 3: The constipation, I think.

Therefore, it is understandable that patients were more likely to use medications as a management strategy.

Participants and their caregivers also heavily relied on nonpharmacological strategies for the management of analgesic AEs. These strategies could be broadly divided into targeted tactics aimed at alleviating a specific AE and nontargeted tactics aimed at addressing a spectrum of AEs.

**Table 3.** Frequency of Adverse Effects Reported by Study Participants (n = 7) on day of Discharge and 1 Week After Discharge.

Adverse effect	Day of discharge	1 week after discharge
<b>Cognitive</b>		
Drowsiness	4 (57)	2 (28)
Fatigue	3 (43)	1 (14)
Impaired memory	1 (14)	1 (14)
Dizziness	2 (28)	0 (0)
Hallucinations	1 (14)	0 (0)
Nightmares	1 (14)	0 (0)
Difficulty concentrating	1 (14)	0 (0)
Emotional distress	1 (14)	0 (0)
Insomnia	0 (0)	1 (14)
<b>Gastrointestinal</b>		
Constipation	4 (57)	4 (57)
Nausea	4 (57)	1 (14)
Vomiting	1 (14)	0 (0)
Abdominal discomfort	3 (43)	0 (0)
Dry mouth	2 (28)	1 (14)
<b>Other</b>		
Pruritus	1 (14)	0 (0)
Edema	1 (14)	0 (0)
Visual blurring	2 (28)	0 (0)

Data are presented as n, % in parenthesis.

**Table 4.** Management Strategies for Adverse Effects Employed by Study Participants on day of Discharge (in-Hospital) and 1 Week After Discharge (at Home).

Management strategy	n	Targeted adverse effect(s)	
		Day of discharge	One week after discharge
<b>Medications</b>			
Stool softener	4	Constipation	5
Enema/suppository	0		2
Antiemetic	2	Nausea	0
<b>Nonpharmacological care</b>			
<b>Targeted strategies</b>			
Diet	1	Constipation	3
Water	2	Dry mouth	1
Warm compress	2	Abdominal discomfort	0
Movement	1	Drowsiness	0
<b>Nontargeted strategies</b>			
Rest	4	Fatigue, drowsiness, nausea, abdominal discomfort, dizziness, general	1
Distraction	3	Fatigue, itching, general	0
Reduction of analgesic intake	3	Drowsiness, constipation, general	1

Targeted strategies reported by participants generally centered around constipation, such as diet modifications and warm compresses for abdominal discomfort. Nontargeted strategies were often self-developed and included distractions (e.g., listening to music, watching TV) and rest (e.g., sleeping, lying down, relaxing). Unlike with medical management, there was less consensus on the effectiveness of nonpharmacological methods, both between and within participants:

Researcher: Has there been anything you've done that's helped with [drowsiness]?

Participant 8: Just sitting up, I guess. Like walking around lots helped.

Researcher: Was there anything you could do to reduce the stomach aches?

Participant 8: Um, not really, other than getting up and walking, but not really.

As the benefit of nonpharmacological strategies was inconsistent and medical strategies primarily managed GI

AEs, patients were left with unaddressed and bothersome AEs. Nonetheless, all participants used nonpharmacological management approaches.

Finally, several patients in the study reduced analgesic intake to minimize AEs. One participant, whose analgesic intake was reduced in-hospital to combat drowsiness, stated that they preferred this strategy:

Participant 8: Taking less and only when needed, I think would be the best.

Overall, participants used a combination of the above strategies. In fact, participants used the greatest variety of techniques to manage constipation:

Participant 7: So, I have said that the main side effect, I think, is constipation ... I'm (...) trying to avoid those kinds of issues by controlling my diet or like eating certain things and drinking lots of fluids, and also taking laxatives.

**Lack of Patient Understanding of AEs.** The interviews revealed that participants lacked a clear understanding of AEs and the role of the health care team in AE management. While participants were able to articulate their experience of AEs after surgery, several participants demonstrated a lack of appreciation of the causal relationship between analgesics and the AEs they experienced. This was especially evident for AEs outside of constipation, nausea, and abdominal discomfort. For instance, Participant 3 had difficulty answering the following question:

Researcher: Have you experienced undesirable effects with the medications that were given to you after your surgery?

Participant 3: Um, do you have examples?

Moreover, only 2 participants were aware that medical staff played a role in managing their non-GI related AEs while in hospital, as exemplified by Participant 6:

Researcher: How did [the nurses and doctors] become involved, if they did, in the side effects you were experiencing? Did any of them do anything to help, for example, with the dizziness?

Participant 6: I think they changed up one of my medications or stopped it.

**Lack of Involvement in own Care.** Another issue brought to light by the interviews was the lack of patients' involvement in their care. Participants 1, 2, 3, and 8 stated that they were not aware of important discharge and follow-up information, such as details of their prescription or the resources available once home. For example, when we asked Participant 1 whether they had received a discharge prescription for a

laxative to help them manage their constipation, they stated “no,” when this was in fact the case. The parents of Participants 2, 4, and 6 interrupted the interview to answer for their child when asked about expectations of follow-up. While some of the older participants acknowledged that they could contact health care professionals if they required help managing AEs at home, they still often deferred this responsibility to their parents:

Researcher: (...) if you continue to experience the side effects that you’ve had here at the hospital, like hallucinations, like drowsiness, nausea, how do you plan on addressing them? For example, the nausea?

Participant 6: Well, I let my mom know and then see if we can talk to someone here about that and what we can do for it.

Some participants reported that the health care team had discussed information about their care not with them but rather with their parent(s). Of note, 1 participant highlighted that while they knew that information had been shared by the medical team about their care, they themselves were not listening:

Researcher: Did they suggest any strategies to help with pain during the trip home?

Participant 8: Um, they probably did, but not when I was listening ... I can’t, I can’t remember, but I’m sure they did.

## Discussion

The intention of this study was to gain a deeper understanding of the AEs of analgesics from the perspective of adolescents with AIS after spine surgery. The findings revealed that GI and cognitive disturbances were the most common AEs. To mitigate analgesic AEs, participants used a combination of 3 main strategies. Overall, the pediatric patients in our study displayed a lack of understanding of AEs as well as a lack of involvement in their own care.

The AEs of drowsiness, nausea, and constipation were frequently described by participants. This finding is largely in agreement with the literature and is likely attributed to the perioperative use of opioids (2,6,11,12). Participants reported that constipation was the most bothersome AE. To the best of our knowledge, only 1 other qualitative study assessed the experience of analgesic AEs from the perspective of pediatric patients (6). In contrast to our findings, Rullander et al (6) found that nausea was the major source of discomfort in patients after corrective scoliosis surgery. The different findings may be explained by their inclusion of parent perspectives and specific questioning about nausea. Moreover, the use of multimodal analgesia, continuous naloxone infusion, and intraoperative dexamethasone may have minimized the impact of nausea on our participants (2,3,12,13).

Constipation persisted for many participants after discharge, despite the general resolution of other AEs. Constipation is a major cause of readmission to hospital in children after surgery and our finding affirms the need for improved home management of the AE (3).

Our study revealed that the pharmacological method was the most used and most effective strategy reported by participants, particularly for GI-related AEs. Indeed, the focus of current recommendations for AE management in pediatric patients after surgery is pharmacological, especially for common opioid-related AEs (2,3). As such, this management strategy has been incorporated into the institutional protocol in the form of patient education, prophylactic therapy, and discharge consideration, likely translating into increased use of the strategy.

In contrast to medical management, there is a clear paucity of pediatric literature on the use and efficacy of nonpharmacological strategies. They have largely been neglected in current recommendations for AE management (2,3,5,12). Our finding that all participants used nonpharmacological strategies to attenuate AEs after surgery highlights the need for further research in this area. Participants often employed targeted nonpharmacological strategies to supplement pharmacological methods, especially for constipation. Similarly, in adults after surgery, the more severe reported nausea, the more likely patients were to use both pharmacologic and non-pharmacologic modalities to manage the AE (14). A multimodal approach to AE management may be beneficial, especially for persistent or severe AEs.

We found that participants also used nontargeted, non-pharmacological strategies, namely rest and distraction. These strategies can be easily implemented and may serve to address a wide array of AEs. Interestingly, distraction has been suggested as a method of pain relief in pediatric patients (15); therefore, its dual purpose further supports its use in the postoperative period. Participants were inclined to employ these strategies despite there being no consensus among them on their effectiveness. As it has been shown that adolescents after surgery desire a sense of control over their own care (6), the use of such strategies may serve to provide autonomy, which may ultimately translate into quicker postoperative recovery. Overall, patients’ perspectives provide insight into potential unexplored AE management strategies and warrant the need for further investigations into their effectiveness.

Reducing analgesic intake, the final AE management strategy reported by participants, is a commonly recommended strategy for minimizing AEs in pediatric patients (2). One important challenge is the risk of inadequate pain control. Importantly, postoperative pain may lead to prolonged hospital stay, delayed rehabilitation, and chronic post-surgical pain (12,16). An environment that fosters open communication with health care staff is warranted to navigate the delicate balance between pain and AE management.

Our study participants demonstrated a lack of understanding of AEs. The Society of Pediatric Anesthesia highlights

the importance of patient education on pain management; however, it fails to mention teachings on analgesic AEs in its clinical practice guideline for opioid use in the perioperative period (3). As such, there is often no institutional standard for AE education and the information received by patients and their caretakers may be highly variable (17). Participants' low health literacy about AEs may impede AE reporting, reduce support from health care professionals, and limit access to resources once home. O'Donnell (18) demonstrated that in adults, one-to-one education about analgesic AE management resulted in greater reporting of AEs and greater use of management strategies postoperatively. These findings support the need for the incorporation of similar AE education in clinical practice guidelines for pediatric postoperative care.

The participants also demonstrated a lack of involvement in their own care. Participants' reliance on caregivers was similarly reported by Dagg et al. (19), who found that adolescent patients showed increased dependence on their parents after discharge, in part due to the experience of distress. The impact of the acute postoperative environment, including anesthetics and emotional stress, on cognitive function (20–22) may partially explain why most participants could only recall partial information regarding discharge instructions. Additionally, some participants described that information about their care was only shared with their parents, in accordance with Dagg et al (19). As information was not being directly conveyed to patients, participants were effectively excluded from their care. It has been demonstrated that parents prefer that care information is shared with their child and would like greater involvement of their children in decision-making processes postoperatively (23). To ensure patient involvement, information should be provided in a patient-centered manner, at the level of understanding of the patient.

There were limitations in our study. Some AEs reported by participants may have been due to the surgery, postoperative pain, or immobilization such as those with kinesiophobia rather than due to analgesics. While parent presence during the interview may have comforted participants, it may have biased what was shared with the interviewer. The timing of the interviews and the wording of the researchers' questions may have influenced the participants' response. The generalizability of these findings may be limited by the small sample size in this study.

## Conclusion

Adolescent patients experienced a myriad of analgesic AEs after spine surgery, particularly constipation, nausea, and drowsiness. Pediatric patients used a combination of strategies to manage their AEs. Nonpharmacological modalities were frequently used to target both specific and general AEs, with varying efficacies. Participants displayed a lack of understanding of AEs and involvement in their own care. Future studies should evaluate the efficacy of non-pharmacological strategies in managing analgesic AEs for pediatric patients after surgery.

## Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Ethical Approval

Ethical approval to report this case series was obtained from the Institutional Review Board of McGill University (A08-M71-14B).

## Informed Consent

Written informed consent was obtained from the patients for their anonymized information to be published in this article.


## Funding


The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported by the Quebec Pain Research Network (Réseau québécois de recherche sur la douleur).


## Statement of Human and Animal Rights

All procedures in this study were conducted in accordance with the Institutional Review Board of McGill University (A08-M71-14B).

## ORCID iDs

Marie Vigouroux  <https://orcid.org/0000-0002-0431-3317>

Richard Hovey  <https://orcid.org/0000-0001-9534-4807>

Catherine E. Ferland  <https://orcid.org/0000-0001-6288-4495>

## References

1. Carter GT, Duong V, Ho S, Ngo KC, Greer CL, Weeks DL. Side effects of commonly prescribed analgesic medications. *Phys Med Rehabil Clin N Am*. 2014;25(2):457-70. DOI: 10.1016/j.pmr.2014.01.007.
2. Jitpakdee T, Mande S. Strategies for preventing side effects of systemic opioid in postoperative pediatric patients. *Paediatr Anaesth*. 2014;24(6):561-8. DOI: 10.1111/pan.12420.
3. Cravero JP, Agarwal R, Berde C, Birmingham P, Côté CJ, Galinkin J, et al. The society for pediatric anesthesia recommendations for the use of opioids in children during the perioperative period. *Paediatr Anaesth*. 2019;29(6):547-71. DOI: 10.1111/pan.13639.
4. Aparasu R, McCoy RA, Weber C, Mair D, Parasuraman TV. Opioid-induced emesis among hospitalized nonsurgical patients: effect on pain and quality of life. *J Pain Symptom Manage*. 1999;18(4):280-8. DOI: 10.1016/s0885-3924(99)00085-8.
5. Chabot B, Ferland CE. Inpatient postoperative undesirable side effects of analgesics management: a pediatric patients and parental perspective. *Pain Rep*. 2020;5(5):e845. DOI: 10.1097/PR9.0000000000000845.
6. Rullander AC, Jonsson H, Lundstrom M, Lindh V. Young people's experiences with scoliosis surgery: a survey of pain, nausea, and global satisfaction. *Orthop Nurs*. 2013;32(6):327-33; quiz 334-5. DOI: 10.1097/NOR.0000000000000007.
7. Neergaard MA, Olesen F, Andersen RS, Sondergaard J. Qualitative description – the poor cousin of health research?

- BMC Med Res Methodol. 2009;9:52. DOI: 10.1186/1471-2288-9-52.
8. Miles MB, Huberman AM, Saldaña J. *Qualitative data analysis : A methods sourcebook*. 3rd ed. Thousand Oaks, CA: Sage Publications, Inc.; 2014.
  9. Patton MQ. *Qualitative evaluation and research methods*. 2nd ed. Washington, DC: Sage Publications, Inc.; 1990.
  10. Milne J, Oberle K. Enhancing rigor in qualitative description. *J Wound Ostomy Continence Nurs*. 2005;32(6):413-20. DOI: 10.1097/00152192-200511000-00014.
  11. Czarniecki ML, Jandrisevits MD, Theiler SC, Martz Huth M, Weisman SJ. Controlled-release oxycodone for the management of pediatric postoperative pain. *J Pain Symptom Manage*. 2004;27(4):379-86. DOI: 10.1016/j.jpainsymman.2003.08.007.
  12. Seki H, Ideno S, Ishihara T, Watanabe K, Matsumoto M, Mirosaki H. Postoperative pain management in patients undergoing posterior spinal fusion for adolescent idiopathic scoliosis: a narrative review. *Scoliosis Spinal Disord*. 2018;13:17. DOI: 10.1186/s13013-018-0165-z.
  13. Murphy JD, Gelfand HJ, Bicket MC, Ouanes JPP, Kumar KK, Isaac GR, et al. Analgesic efficacy of intravenous naloxone for the treatment of postoperative pruritus: a meta-analysis. *J Opioid Manag*. 2011;7(4):321-7. DOI: 10.5055/jom.2011.0073.
  14. Odom-Forren J, Hooper V, Moser DK, Hall LA, Lennie TA, Holtman J, et al. Postdischarge nausea and vomiting: management strategies and outcomes over 7 days. *J Perianesth Nurs*. 2014;29(4):275-84. DOI: 10.1016/j.jopan.2013.12.007.
  15. Guntinas-Lichius O, Volk GF, Geissler K, Komann M, Meissner W. Pain after pediatric otorhinolaryngologic surgery: a prospective multi-center trial. *Eur Arch Otorhinolaryngol*. 2014;271(7):2049-60. DOI: 10.1007/s00405-014-2914-9.
  16. Ocaý DD, Li MMJ, Ingelmo P, Ouellet JA, Pagé MG, Ferland CE. Predicting acute postoperative pain trajectories and long-term outcomes of adolescents after spinal fusion surgery. *Pain Res Manag*. 2020;2020:9874739. DOI: 10.1155/2020/9874739. eCollection 2020.
  17. Simons J, Roberson E. Poor communication and knowledge deficits: obstacles to effective management of children's postoperative pain. *J Adv Nurs*. 2002;40(1):78-86. DOI: 10.1046/j.1365-2648.2002.02342.x.
  18. O'Donnell KF. Preoperative pain management education: an evidence-based practice project. *J Perianesth Nurs*. 2018;33(6):956-63. DOI: 10.1016/j.jopan.2017.11.001.
  19. Dagg B, Forgeron P, Macartney G, Chartrand J. Adolescent Patients' management of postoperative pain after discharge: a qualitative study. *Pain Manag Nurs*. 2020;21(6):565-71. DOI: 10.1016/j.pmn.2020.04.003.
  20. Millar K, Bowman AW, Burns D, McLaughlin P, Moores T, Morton NS, et al. Children's cognitive recovery after day-case general anesthesia: a randomized trial of propofol or isoflurane for dental procedures. *Paediatr Anaesth*. 2014;24(2):201-7. DOI: 10.1111/pan.12316.
  21. Yin J, Wang SL, Liu XB. The effects of general anaesthesia on memory in children: a comparison between propofol and sevoflurane. *Anaesthesia*. 2014;69(2):118-23. DOI: 10.1111/anae.12504.
  22. Ari AB, Peri T, Margalit D, Galili-Weisstub E, Udassin R, Benerroch F. Surgical procedures and pediatric medical traumatic stress (PMTS) syndrome: assessment and future directions. *J Pediatr Surg*. 2018;53(8):1526 – 1531. DOI: 10.1016/j.jpedsurg.2017.10.043.
  23. Tait AR, Voepel-Lewis T, Snyder RM, Malviya S. Parents' understanding of information regarding their child's postoperative pain management. *Clin J Pain*. 2008;24(7):572-7. DOI: 10.1097/AJP.0b013e31816b7cdf.