International Journal of Nursing Studies 62 (2016) 36–43

Contents lists available at ScienceDirect

International Journal of Nursing Studies

journal homepage: www.elsevier.com/ijns

Postoperative paediatric pain prevalence: A retrospective analysis in a university teaching hospital

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ARTICLE INFO

Article history:
Received 27 November 2015
Received in revised form 12 July 2016
Accepted 12 July 2016

Keywords:
Age factors
Body mass index
Paediatrics
Postoperative pain
Retrospective studies
Children's and Infants' Postoperative Pain Scale
Faces Pain Scale – Revised

ABSTRACT

Background: Overall pain prevalence in paediatric patients is well documented, but relatively little attention has been paid to pain prevalence and intensity on specific postoperative days within the first week following an operation.
Objectives: To evaluate reported pain prevalence on the day of surgery and each day during the following week and to analyse pain trajectories.
Design: Retrospective study.
Setting: Single centre university hospital.
Participants: 815 postoperative children and adolescents (age $\leq$ 18 years) were included (female: 36%, age 9.8 $\pm$ 5.8). Children with ear, nose, throat (e.g. tonsillectomy), eye (e.g. strabismus repair) or dental surgery (e.g. dental extraction) were treated at other departments and therefore were not included in this study.
Methods: Retrospective analysis of the overall and clinically relevant (pain score $\geq$4/10) postoperative pain prevalence in children and adolescents during the first week after surgery. Possible influencing factors (age, sex, body mass index, type of anaesthesia, type of surgery and duration of surgery) on pain trajectories are analysed using mixed model techniques.
Results: Overall, 36% of 815 analysed children and adolescents suffered from pain $\geq$4 during their entire hospital stay. Compared to the day of surgery, the number of patients with pain $\geq$4 was slightly higher on day 1 after surgery (21% vs. 25%, respectively). In self-reported pain intensity rating (done for patients age $\geq$ 4 years) the type of surgery ($p < .001$) was the only significant variable influencing pain intensity. In observational pain assessment (age < 4 years) pain scores increased with patient's age ($p = .004$). In this patient group, pain intensity ratings did not differ between types of surgery ($p = .278$).
Conclusion: Type of surgery is an important predictor for self-reported pain intensity ratings in children but not for observational pain assessment in younger children. In younger children observational pain assessment ratings increase with age.

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URL: http://www.medunigraz.at

http://dx.doi.org/10.1016/j.ijnurstu.2016.07.011
0020-7489/

What is already known about the topic?

- In adults predictors for pain are extensively analysed (e.g. preoperative pain, anxiety, psychological distress, age and type of surgery).
- In children and adolescents only a few studies have analysed predictors for pain (age, number of invasive procedures and admitted diagnosis).

What this paper adds

- If pain is self-reported, clinically relevant pain in children and adolescents is mainly influenced by the type of surgery.
- Observational based pain ratings in children younger than four years are mainly influenced by the patient's age.
- Nurses should be educated to avoid this age bias.

1. Introduction

Postoperative pain is an extremely common problem in adult and paediatric patients undergoing surgery. In hospitalized adult patients, pain prevalence during an interview varied between 33% and 50% (Abbott et al., 1992; Strohbuecker et al., 2005). Pain prevalence in hospitalized children shows similar results (Cummings et al., 1996; Kendlbacher et al., 2010; Forgeron et al., 2005; Taylor et al., 2008). Looking at the 24 h before pain assessment the pain prevalence in adults rose to 67% (Abbott et al., 1992; Strohbuecker et al., 2005; Salomon et al., 2002; Wadenstein et al., 2011) and in children to 87% (Taylor et al., 2008; Johnston et al., 1992). Focusing only on clinically relevant pain during the last 24 hours prior to the interview the number of paediatric patients reporting pain decreased to between 18% and 49% (Taylor et al., 2008; Johnston et al., 1992).

Predictors for pain have been widely studied in adult patients. Vivian et al. (2009) reviewed 48 studies and concluded that preoperative pain, anxiety, psychological distress, age and type of surgery are significant predictors for postoperative pain in adults. Similar results were found in children for preoperative anxiety (Chieng et al., 2004) and type of surgery (Balga et al., 2013). In children the most painful surgeries were (adeno)tonsillectomy and appendectomy (Balga et al., 2013; Gillies et al., 1999). Furthermore, Cummings et al. (1996) reported that pain in acute conditions was higher than in chronic conditions. In children no impact on pain was found for a number of invasive procedures and admitted diagnoses (Cummings et al., 1996; Kendlbacher et al., 2010; Taylor et al., 2008). Results on the influence of sex, age, and previous surgery on paediatric pain intensity are contradictory. (Chieng et al., 2004; Pagé et al., 2012). A weakness of these prior studies was that they evaluated the impact of different possible predictors of pain only at one time point (e.g. 1st postoperative day).

At the University Hospital of Graz approximately 3500–4000 paediatric patients have a surgical intervention every year. Details concerning our standardised pain management have been described previously (Messerer et al., 2010). The Children's and Infants' Postoperative Pain Scale (observational tool) is used for assessing the actual pain in children before their 4th birthday (Büttner et al., 1998). In older children (4–18 years) the Faces Pain Scale – Revised (self-report tool) by Hicks is used (Büttner and Finke, 2000; Hicks et al., 2001). The first assessment is performed at admission to the regular ward, followed by three further assessments every day during their hospital stay (pain at rest; in the morning, at noon, and in the evening). In case of pain ≥4, an analgesic on demand is administered and documented on the patient's chart. The effectiveness of the drug given is evaluated and re-assessed. All pain assessments are graphically displayed in the regular patients' charts. Side effects, physiological data and the provided pain therapy are also documented (Chieng et al., 2004).

The aim of the present study was to evaluate pain prevalence on the day of surgery and of postoperative pain prevalence at each day during the following week. All of the recorded pain scores were reviewed and the maximum pain score for each day was analysed. Furthermore, pain trajectories and possible influencing factors were analysed.

2. Methods

This study was conducted in accordance with the Declaration of Helsinki (World Medical Association). The study protocol has been approved by the local ethics committee, Medical University of Graz, Austria (Ethic Committee number 24-390ex11/12) and is written according to the criteria to STrengthening the Reporting of OBservational studies in Epidemiology (STROBE criteria) in its current version (Vandenbroucke et al., 2007). This retrospective study was conducted at the Department of Paediatric and Adolescent Surgery at the University Hospital of Graz, Austria, and comprised all inpatient postoperative paediatric patients who underwent surgery between August and December 2011. Exclusion criteria were day surgery patients, patients in the intensive care unit, and patients with cognitive impairment. Furthermore, children with ear, nose, throat (e.g. tonsillectomy), eye (e.g. strabismus repair) or dental surgery (e.g. dental extraction) were treated at other departments and therefore were not included in this study.

Patient data (sex, date of birth, weight, and height), type, duration and date of surgery, and peri-/postoperative therapy were extracted from the institutional hospital information system. For further analysis, the types of surgery were grouped into abdominal surgery, bone surgery, surgery on knee, hip or shoulder, surgery on tendons, nerves and ligaments, metal-implant removal, minor surgery (e.g. wound treatment, incision of an abscess, removal of foreign body, wedge resection), surgical interventions on the urinary tract, endoscopic examinations and others. Pain scores are graphically displayed in the patients' chart. Out of these pain scores, the maximum pain score per day was selected. Age and sex adjusted body mass index *z*-scores were calculated according to World Health Organisation Child Growth Standards (de Onis et al., 2007). A body mass index *z*-score of 0 refers to the expected body mass index of this age group and sex. A body mass index *z*-score of +1 corresponds to a body mass index score that is