RESEARCH

Postoperative Analgetic Profile in Pediatric Patients at Dr. Kariadi Hospital

Heru Dwi Jatmiko[✉*], Chandra Hermawan Manapa[**], Polmihotdin Hutagalung[***]

[*]Department of Anesthesiology and Intensive Therapy, Faculty of Medicine, Diponegoro University/Dr. Kariadi Hospital, Semarang, Indonesia
[**]Faculty of Medicine, Diponegoro University, Semarang, Indonesia
[***]K.R.M.T Wongsonegoro Regional Public Hospital, Semarang, Indonesia

[✉]Correspondence: herudwijatmiko@gmail.com

ABSTRACT

Background: Pain management is pivotal for pediatric patients post-surgery due to its common occurrence and significant impact on well-being. Effective management involves considerations such as surgical type, analgesic selection, and proper pain assessment.

Objective: Knowing the profile of postoperative analgesia in pediatric patients at Dr. Kariadi Hospital using pain assessment instruments based on age classification.

Method: Employing an observational descriptive approach with a prospective cohort design, the study sampled 172 pediatric patients across varying pain severity levels. Utilizing total sampling, patients were assessed using age-specific pain instruments. Descriptive statistics were utilized to describe patients' characteristics, as well as the attributes of analgesic effectiveness concerning age, surgery type, and drugs administered. Texts and tables were employed to present the results.

Results: Sampling on 172 patients with grouping based on the type of surgery that causes mild, moderate, and severe pain. Pain scales and analgesics were recorded at 4 moments: (1) when entering the recovery room; (2) leaving the recovery room; (3) 8 hours and (4) 24 hours postoperative. The results showed that the highest use of analgesics was paracetamol alone (59.9%); analgesic effectiveness in the mild pain surgery 97.2-98.6%; moderate pain 92.2-98.9%, and severe pain 90.9-100%.

Conclusion: Postoperative analgesic utilization in pediatric patients at Dr. Kariadi Hospital is generally adequate, predominantly relying on paracetamol. However, enhancements are needed to optimize pain management, particularly for moderate-to-severe pain cases. Strategies to improve analgesic effectiveness should be pursued to ensure comprehensive pain relief for pediatric surgical patients.

Keywords: analgesic; analgetic profile; analgetic effectiveness; pediatric; postoperative

INTRODUCTION

Postoperative pain in children is a common problem, with approximately 33% of pediatric patients experiencing moderate-to-severe levels of pain following a surgical procedure. Effective pain management involves pharmacological and non-pharmacological approaches, such as psychological and physiotherapy. According to the International Association for the Study of Pain (IASP), pain is an unpleasant sensory and emotional experience associated with tissue damage.[1,2]

The importance of pain management is emphasized within hospitals, with some countries, including Poland, implementing "pain-free hospital" certification as a quality indicator. In Indonesia, the National Hospital Accreditation Standard (SNARS) regulates pain management in the assessment instruments management, communication, and education (MKE) and patient and family rights (HPK).[1,3]

Acute pain care generally uses co-analgesia techniques based on four classes of analgesics: local anesthetics, opioids, NSAIDs, and acetaminophen. An individualized pain management plan is developed based on the assessment and documentation of the child's pain, with a structured protocol for postoperative analgesia. Dr. Kariadi Hospital, as a referral hospital and education center for anesthesiologists in Central Java, has an important role in pain care.[4,5]

Dr. Kariadi Hospital serves as the premier referral hospital in Central Java and functions as a key training center for anesthesiologists. This institution benefits from a diverse team of human resources across various anesthesia subspecialties and is equipped with supporting facilities to enhance pain services, both for educational purposes and to ensure patient satisfaction. Anesthesiologists are responsible for monitoring the effectiveness of services rendered, ensuring that the pain management provided is adequate, thereby contributing to the realization of a pain-free hospital environment.

While there is currently no available data on postoperative pain services at Dr. Kariadi Hospital, any instances of untreated pain are believed to be negligible. However, it is imperative to conduct a study to assess the analgesic profile administered to postoperative pediatric patients at Dr. Kariadi Hospital in Semarang.

METHODS

Patients

This observational descriptive study centers on the pediatric patient population undergoing surgical procedures at the central surgical installation (IBS) of Dr. Kariadi Hospital from April to May 2021. The total sampling method was employed to select the study sample, encompassing all pediatric patients meeting predetermined inclusion and exclusion criteria. Inclusion criteria comprised patients aged less than 18 years, undergoing surgery at the IBS of Dr. Kariadi Hospital, and expressing willingness to participate by providing informed consent.

Conversely, postoperative patients requiring intensive care, outpatients, or those undergoing one-day surgery procedures were excluded based on specific criteria. Dropout criteria were established, including patients who passed away within 24 hours postoperatively or exhibited decreased consciousness that could impede pain assessment.

Variables

The dependent variables analyzed in this study comprised the type of surgery and the age of the patients. Surgery type was categorized based on the level of pain and risk associated with the procedure, with measurement outcomes expressed in three levels: mild, moderate, and severe, using an ordinal scale. Meanwhile, patient age was assessed based on the timing of data collection, measured in days, months, and years. Age groups were divided into four categories: neonates, 2 months to 3 years, 3

years to 8 years, and over 8 years, using an interval scale.

The independent variable in this study was postoperative pain, evaluated at several time points: upon the patient's admission to the recovery room (RR), upon return to the room, and 8 and 24 hours postoperatively. Pain assessment was conducted using different tools according to the patient's age range: CRIES for neonates, FLACC for ages above 1 month to 3 years, Wong Baker for ages above 3 years to 8 years, and VAS for ages above 8 years, with all measurements using an interval scale.

If the administration of drugs leads to a reduction in pain measurement results on the scale, then the provided analgesia management is deemed effective; conversely, if it produces the opposite outcome, it is categorized as ineffective.

Data Collection

The researchers provided an explanation to the parents or guardians of the participants, elucidating the background, objectives, and entire data collection process. Afterward, permission was requested from the research subjects to take part in the study. Data gathering was carried out on individuals who fulfilled the criteria for both inclusion and exclusion.Subsequently, the patient's particulars, including name, age, medical record number, and surgical procedure details, were recorded.

Following that, we documented the criteria for the severity of surgical pain, categorized as mild, moderate, and severe in accordance with predetermined classifications as mentioned below. The assessment of pain levels was executed based on specific criteria corresponding to the patient's age range. This involved using the CRIES scale for neonates, the FLACC scale for those aged two months to three years, the Wong-Baker scale for ages three to eight years, and the Visual Analog Scale (VAS) for those above eight years.[1,2]

The time points for data collection were noted at four stages: upon the patient's entry into the recovery room (RR), upon returning to the room, 8 hours postoperatively, and 24 hours postoperatively. Conclusively, we documented information about the postoperative analgesics administered in adherence to the established postoperative instructions.

Data Analysis and Description

The data collected in this study have been successfully processed using the SPSS for Windows program. This study conducted a data description to provide a clear picture regarding several aspects. First, the characteristics of the study sample were analyzed based on age, operative pain group, postoperative pain scale, and the type of postoperative analgesics used. Furthermore, the effectiveness of postoperative analgesics was evaluated against the different types of surgeries performed. The analysis also involved understanding the age range of the study participants and the extent to which the effectiveness of postoperative analgesics may vary depending on the type of surgery applied. In addition, the study included an overview of the commonly used analgesic drug options and the extent of their effectiveness against specific types of surgeries.

Ethical Statement

The methodologies employed in this study received an approval from the Health Research Ethics Committee of RSUP Dr. Kariadi under the ethical approval number 805/EC/KEPK-RSDK/2021. Preceding the procedures, all patients participated by providing informed consent by formally signing relevant documentation.

RESULTS

Subjects' Characteristics

This descriptive study involved 172 pediatric patients undergoing elective or emergency surgery, meeting the elligible inclusion criteria. Data collection occurred in the operating room, recovery room, and pediatric ward treatment room at Dr. Kariadi Hospital.

Table 1 outlines the characteristics of the study data. The prevalence of females exceeded that of males, with the majority falling within the age group of 8 to under 18 years. The most frequently performed type of surgery belonged to the moderate surgery group, accounting for 90 patients (52.3%). The average pain scale among patients was 1.49±0.693. Paracetamol was the most commonly used analgesic, administered to 103 patients (59.9%), while the least common were combinations involving paracetamol and ketamine, paracetamol, ketorolac, and ketamine, and paracetamol, fentanyl, and ketamine, each with only one patient (0.6%). Table 2 illustrates the mean postoperative pain scale for each time group, indicating a pain scale ranging from 1 to 4 for all subjects in the study.

Table 1. Characteristic data of subjects

Variables (n = 172)		n	%
Gender	• Male	80	46,5
	• Female	92	53,5
Age category	• Neonates (0 – 28 days)	1	0,6
	• >1 month - <3 years	49	28,5
	• 3 years - <8 years	27	15,7
	• 8 years - <18 years	95	55,2
Type of surgery	• Minor	71	98,8
	• Moderate	90	52,3
	• Major	11	6,4
Pain scale on admission of recovery room	• Effective	170	98,8
	• Ineffective	2	1,2
Pain scale on discharge from the recovery room (45 minutes postoperative)	• Effective	163	94,8
	• Ineffective	9	5,2
Pain scale 8 hours postoperative	• Effective	163	94,8
	• Ineffective	9	5,2
Pain scale 24 hours postoperative	• Effective	169	98,3
	• Ineffective	3	1,7
Postoperative analgetic	• Paracetamol	103	59,9
	• Ketorolac	2	1,2
	• Paracetamol and Ketorolac	38	22,1
	• Paracetamol and Fentanyl	6	3,5
	• Paracetamol and Ketamine	1	0,6
	• Paracetamol, Ketorolac, Fentanyl	17	9,9
	• Paracetamol, Ketorolac, Ketamine	1	0,6
	• Paracetamol, Ketorolac, Neuroaxial (Epidural)	3	1,7
	• Paracetamol, Fentanyl, Ketamine	1	0,6

Table 2. Postoperative pain scale characteristics

Postoperative pain scale (n = 172)	Mean ± SD	Median (min – max)
On RR admission (postoperative)	1,76 ± 0,756	2 (1 – 4)
On RR discharge (45 minutes postoperative)	1,9 ± 0,866	2 (1 – 4)
8 hours postoperative	1,83 ± 0,866	2 (1 – 4)
24 hours postoperative	1,73 ± 0,756	2 (1 – 4)

Description: SD (standard deviation); min (minimum); max (maximum)

Overview of Analgesic Effectiveness by Surgery Type

The analgesic chosen for pain management must consider the possible degree of pain that will appear based on the type of surgery. An overview of the effectiveness of analgesics against the type of surgery can be seen in Tables 7-10. A total of 170 patients (98.8%) had a pain scale <4, and 2 patients (1.2%) had a pain scale ≥4 when entering the RR (postoperative). A total of 163 patients (94.8%) had a pain scale <4, and 9 patients (5.2%) had a pain scale ≥4 at RR discharge (45 minutes postoperatively) and at 8 hours postoperatively. A total of 169 patients (98.3%) had a pain scale <4, and 3 patients (1.7%) had a pain scale ≥4 at RR discharge (45 minutes postoperative) and at 8 hours postoperative.

Overview of Analgesic Effectiveness by Age Range and Surgery Type

Consideration of age range is crucial when using postoperative analgesics to prevent adverse side effects resulting from the use of inappropriate medications. An overview of analgesic effectiveness upon entering the recovery room (RR) postoperatively, categorized by age range and surgery type, is presented in Table 7. There was only one neonate patient, and the analgesic was effective. In patients aged more than one month to three years, the postoperative analgesic effect was found to be effective in 47 patients (95.9%), with 100% effectiveness in severe pain but ineffective in one patient with mild and moderate surgery. Patients aged three to less than eight years and 8 to under 18 exhibited 100% effectiveness in managing mild, moderate, and severe pain.

The assessment at discharge (45 minutes postoperative) based on age range and surgery type can be seen in Table 8. Only one neonate patient was effective. In patients aged more than one month to three years, 42 patients (85.7%) experienced an effective analgesic effect, with 100% effectiveness in severe pain but ineffectiveness in two patients (11.1%) with mild surgery and five patients (17.9%) with moderate surgery. In the age range of three to less than eight years, 25 patients (92.6%) were effective, and two patients (7.4%) were ineffective. The postoperative analgesic effect in patients aged 8 to under 18 years was 100% effective in managing mild, moderate, and severe pain.

Table 9 provides an overview of analgesic effectiveness at 8 hours postoperatively based on age range and surgery type. There was only one effective neonate patient. In patients aged more than one month to three years, the postoperative analgesic effect was found to be effective in 45 patients (91.8%), with 100% effectiveness in severe pain but ineffectiveness in one patient with mild and moderate surgery. Patients aged three to less than eight years showed that 22 patients (81.5%) were effective and five (18.5%) were ineffective against postoperative analgesics. The effect of postoperative analgesics in patients aged 8 to under 18 years was 100% effective in treating mild, moderate, and severe pain.

Similarly, at 24 hours postoperatively, one neonate patient was effective. In patients aged more than one month to three years, the postoperative analgesic effect was effective in 48 patients (98%), with 100% effectiveness in severe pain but ineffectiveness in one patient (3.6%) with

moderate surgery. Patients aged three to less than eight years demonstrated that 25 patients (92.6%) were effective and two (7.4%) were ineffective against postoperative analgesics. The effect of postoperative analgesics in patients aged 8 to under 18 years was 100% effective in treating mild, moderate, and severe pain.

Overview of Medication Choice and Analgesic Effectiveness by Surgery Type

Tables 11-14 provide a comprehensive overview of drug selection and analgesic efficacy upon admission to the recovery room (RR) postoperatively, at RR discharge (45 minutes postoperative), 8 hours postoperative, and 24 hours postoperative, categorized by the type of surgery. Paracetamol emerged as the predominant analgesic, proving effective in 101 patients (98.1%) and ineffective in 2 patients (1.9%). The most frequently employed analgesic combination was paracetamol and ketorolac in 38 patients, demonstrating 100% effectiveness upon RR admission.

Assessment at RR discharge (45 minutes postoperative), based on the type of surgery, revealed paracetamol as the most commonly utilized analgesic, effective in 95 patients (92.3%) and ineffective in 8 patients (7.8%). Ketorolac, employed in 2 patients undergoing moderate surgery, exhibited one effective and one ineffective outcome. The prevalent analgesic combination remained paracetamol and ketorolac in 38 patients, with single analgesics and other combinations displaying 100% effectiveness at RR discharge.

Similarly, at 8 hours postoperatively, paracetamol was the most frequently used analgesic, proving effective in 95 patients (92.3%) and ineffective in 8 patients (7.8%). Ketorolac, administered in 2 patients with moderate surgery, demonstrated one effective and one ineffective outcome. The primary analgesic combination continued to be paracetamol and ketorolac in 38 patients, while other combinations maintained 100% effectiveness at 8 hours postoperatively.

At 24 hours postoperatively, paracetamol remained the most frequently used analgesic, effective in 100 patients (97.1%) and ineffective in 3 patients (2.9%). Ketorolac, utilized in 2 patients undergoing moderate surgery, exhibited one effective and one ineffective outcome. The prevalent analgesic combination persisted as paracetamol and ketorolac in 38 patients, with other combinations displaying 100% effectiveness at 24 hours postoperatively.

Table 3. Overview of analgesic effectiveness at RR admission (postoperative) by surgery type

Effectiveness	Type of surgery			Total (n = 172)
	Minor (n = 71)	Moderate (n = 90)	Major (n = 11)	
Effective	70 (98.6%)	89 (98.8%)	11 (100%)	170 (98.8%)
Ineffective	1 (1.4%)	1 (1.1%)	0 (0%)	2 (1.2%)

Table 4. Overview of analgesic effectiveness at RR discharge (45 minutes postoperative) by surgery type

Effectiveness	Type of surgery			Total (n = 172)
	Minor (n = 71)	Moderate (n = 90)	Major (n = 11)	
Effective	69 (97.2%)	83 (92.2%)	11 (100.0%)	163 (94.8%)
Ineffective	2 (2.8%)	7 (7.8%)	0 (0.0%)	9 (5.2%)

Table 5. Overview of analgesic effectiveness at 8 hours postoperative by surgery type

Effectiveness	Type of surgery			Total (n = 172)
	Minor (n = 71)	Moderate (n = 90)	Major (n = 11)	
Effective	69 (97.2%)	84 (93.3%)	10 (90.9%)	163 (94.8%)
Ineffective	2 (2.8%)	6 (6.7%)	1 (9.1%)	9 (5.2%)

Table 6. Overview of analgesic effectiveness at 24 hours postoperative by surgery type

Effectiveness	Type of surgery			Total (n = 172)
	Minor (n = 71)	Moderate (n = 90)	Major (n = 11)	
Effective	70 (98.6%)	88 (97.8%)	11 (100.0%)	169 (98.3%)
Ineffective	1 (1.4%)	2 (2.2%)	0 (0.0%)	3 (1.7%)

Table 7. Overview of age range and analgesic effectiveness at RR admission (postoperative) by type of surgery

Surgery Type	Neonates		>1 months – 3 years		3 - <8 years		8 - <18 years	
	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective
Minor			17 (94.4%)	1 (5.6%)	15 (100%)	0 (0%)	38 (100%)	0 (0%)
Moderate	1 (100%)	0 (0%)	27 (96.4%)	1 (3.6%)	12 (100%	0 (0%)	49 (100%)	0 (0%)
Major			3 (100%)	0 (0%)			8 (100%)	0 (0%)
Total	1 (100%)	0 (0%)	47 (95.9%)	2 (4.1%)	27 (100%)	0 (0%)	95 (100%)	0 (0%)

Table 8. Overview of age range and analgesic effectiveness at RR discharge (45 minutes postoperative) by type of surgery

Surgery Type	Neonates		>1 months – 3 years		3 - <8 years		8 - <18 years	
	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective
Minor			16 (88.9%)	2 (11.1%)	15 (100%)	0 (0%)	38 (100%)	0 (0%)
Moderate	1 (100%)	0 (0%)	23 (83.3%)	5 (17.9%)	10 (83.3%)	2 (16.7%)	49 (100%)	0 (0%)
Major			3 (100%)	0 (0%)			8 (100%)	0 (0%)
Total	1 (100%)	0 (0%)	42 (85.7%)	7 (14.3%)	25 (92.6%)	2 (7.4%)	95 (100%)	0 (0%)

Table 9. Overview of age range and analgesic effectiveness at 8 hours postoperative by type of surgery

Surgery Type	Neonates		>1 months – 3 years		3 - <8 years		8 - <18 years	
	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective
Minor			17 (94.4%)	1 (5.6%)	14 (93.3%)	1 (6.7%)	38 (100%)	0 (0%)
Moderate	1 (100%)	0 (0%)	26 (92.9%)	2 (7.1%)	8 (66.7%)	4 (33.3%)	49 (100%)	0 (0%)
Major			2 (66.7%)	1 (33.3%)			8 (100%)	0 (0%)
Total	1 (100%)	0 (0%)	45 (91.8%)	4 (8.2%)	22 (81.5%)	5 (18.5%)	95 (100%)	0 (0%)

Table 10. Overview of age range and analgesic effectiveness at 24 hours postoperative by type of surgery

Surgery Type	Neonates		>1 months – 3 years		3 - <8 years		8 - <18 years	
	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective
Minor			18 (100%)	0 (0%)	14 (93,3%)	1 (6.7%)	38 (100%)	0 (0%)
Moderate	1 (100%)	0 (0%)	27 (96.4%)	1 (3.6%)	11 (91.7%)	1 (8.3%)	49 (100%)	0 (0%)
Major			3 (100%)	0 (0%)			8 (100%)	0 (0%)
Total	1 (100%)	0 (0%)	48 (98%)	1 (2)	25 (92.6%)	2 (7.4%)	95 (100%)	0 (0%)

Table 11. Overview of drug choice and analgesic effectiveness at RR admission (postoperative) by type of surgery

Surgery Type	Paracetamol		Ketorolac		Paracetamol & Ketorolac		Paracetamol & Fentanyl		Paracetamol & Ketamine		Paracetamol, Ketorolac, & Fentanyl		Paracetamol, Ketorolac, & Ketamine		Paracetamol, Ketorolac, & Epidural		Paraceatmol, Ketorolac, & Ketamine	
	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective
Minor	55 (98.2%)	1 (1.8%)			12 (100%)	0 (0%)			1 (100%)	0 (0%)	2 (100%)	0 (0%)						
Moderate	42 (97.7%)	1 (2.3%)	2 (100%)	0 (0%)	26 (100%)	0 (0%)	6 (100%)	0 (0%)			10 (100%)	0 (0%)	1 (100%)	0 (0%)	2 (100%)	0 (0%)		
Major	4 (100%)	0 (0%)									5 (100%)	0 (0%)			1 (100%)	0 (0%)	1 (100%)	0 (0%)
Total	101 (98.1)	2 (1.9%)	2 (100%)	0 (0%)	38 (100%)	0 (0%)	6 (100%)	0 (0%)	1 (100%)	0 (0%)	17% (100%)	0 (0%)	1 (100%)	0 (0%)	3 (100%)	0 (0%)	1 (100%)	0 (0%)

Table 12. Overview of drug choice and analgesic effectiveness at RR discharge (45 minutes postoperative) by type of surgery

Surgery Type	Paracetamol		Ketorolac		Paracetamol & Ketorolac		Paracetamol & Fentanyl		Paracetamol & Ketamine		Paracetamol, Ketorolac, & Fentanyl		Paracetamol, Ketorolac, & Ketamine		Paracetamol, Ketorolac, & Epidural		Paraceatmol, Ketorolac, & Ketamine	
	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective
Minor	54 (96.4%)	2 (3.6%)			12 (100%)	0 (0%)			1 (100%)	0 (0%)	2 (100%)	0 (0%)						
Moderate	37 (86%)	6 (14%)	1 (50%)	1 (50%)	26 (100%)	0 (0%)	6 (100%)	0 (0%)			10 (100%)	0 (0%)	1 (100%)	0 (0%)	2 (100%)	0 (0%)		
Major	4 (100%)	0 (0%)									5 (100%)	0 (0%)			1 (100%)	0 (0%)	1 (100%)	0 (0%)
Total	95 (92.2%)	8 (7.8%)	1 (50%)	1 (50%)	38 (100%)	0 (0%)	6 (100%)	0 (0%)	1 (100%)	0 (0%)	17% (100%)	0 (0%)	1 (100%)	0 (0%)	3 (100%)	0 (0%)	1 (100%)	0 (0%)

Table 13. Overview of drug choice and analgesic effectiveness at 8 hours postoperative by type of surgery

Surgery Type	Paracetamol		Ketorolac		Paracetamol & Ketorolac		Paracetamol & Fentanyl		Paracetamol & Ketamine		Paracetamol, Ketorolac, & Fentanyl		Paracetamol, Ketorolac, & Ketamine		Paracetamol, Ketorolac, & Epidural		Paraceatmol, Ketorolac, & Ketamine	
	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective
Minor	54 (96.4%)	2 (3.6%)			12 (100%)	0 (0%)			1 (100%)	0 (0%)	2 (100%)	0 (0%)						
Moderate	48 (88.4%)	5 (11.6%)	1 (50%)	1 (50%)	26 (100%)	0 (0%)	6 (100%)	0 (0%)			10 (100%)	0 (0%)	1 (100%)	0 (0%)	2 (100%)	0 (0%)		
Major	3 (75%)	1 (25%)									5 (100%)	0 (0%)			1 (100%)	0 (0%)	1 (100%)	0 (0%)
Total	95 (92.2%)	8 (7.8%)	1 (50%)	1 (50%)	38 (100%)	0 (0%)	6 (100%)	0 (0%)	1 (100%)	0 (0%)	17% (100%)	0 (0%)	1 (100%)	0 (0%)	3 (100%)	0 (0%)	1 (100%)	0 (0%)

Table 14. Overview of drug choice and analgesic effectiveness at 24 hours postoperative by type of surgery

Surgery Type	Paracetamol		Ketorolac		Paracetamol & Ketorolac		Paracetamol & Fentanyl		Paracetamol & Ketamine		Paracetamol, Ketorolac, & Fentanyl		Paracetamol, Ketorolac, & Ketamine		Paracetamol, Ketorolac, & Epidural		Paraceatmol, Ketorolac, & Ketamine	
	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective	Effective	Ineffective
Minor	55 (98.2%)	1 (1.8%)			12 (100%)	0 (0%)			1 (100%)	0 (0%)	2 (100%)	0 (0%)						
Moderate	41 (95.3%)	2 (4.7%)	1 (50%)	1 (50%)	26 (100%)	0 (0%)	6 (100%)	0 (0%)			10 (100%)	0 (0%)	1 (100%)	0 (0%)	2 (100%)	0 (0%)		
Major	4 (100%)	0 (0%)									5 (100%)	0 (0%)			1 (100%)	0 (0%)	1 (100%)	0 (0%)
Total	100 (97.1)	3 (2.9%)	1 (50%)	1 (50%)	38 (100%)	0 (0%)	6 (100%)	0 (0%)	1 (100%)	0 (0%)	17% (100%)	0 (0%)	1 (100%)	0 (0%)	3 (100%)	0 (0%)	1 (100%)	0 (0%)

DISCUSSION

Pain represents the most common grievance among postoperative pediatric patients, defined as an unpleasant sensory and emotional encounter linked to actual or potential tissue damage.[2,6] This complaint not only diminishes the patient's quality of life but also impacts the quality of hospital anesthesia services.[7] Various factors, including age, family education, socio-cultural aspects, growth and development, and living environment, influence how children respond to and express pain, ranging from furrowing the brow to tantrum-like hysterical screaming.[8,9,10]

Infants possess an underdeveloped nervous system at birth, with brain development and myelination occurring in the first year of life.[11,12] Despite some primitive reflexes, newborns necessitate a stronger stimulus to elicit a response, typically expressed through crying or whole-body movements.[13] The motor response, specific to the level of myelination, requires different instruments for pain assessment at distinct age levels.[1,14,15]

The study encompassed 172 pediatric patients, meeting the inclusion criteria. Although Dr. Kariadi Hospital solely employs Wong-Baker for pediatric pain assessment, anesthesiologists need detailed knowledge to provide precise pain management.

The gender distribution was nearly equal between males (46.5%) and females (53.5%). Single paracetamol was the most frequently prescribed analgesic (59.9%), followed by a combination of paracetamol and ketorolac (22.1%). Moderate pain intensity surgeries, including ENT, abdominal, and oral-maxillofacial surgery, constituted the most common surgical groups (52.3%). According to WHO pain management, paracetamol is recommended for mild pain; however, this study used it for mild pain (41.3%) and moderate pain.[14]

The neonate age group was underrepresented (0.6%) due to exclusion criteria related to postoperative care in PBRT or NICU, while the largest sample belonged to the age group 8 years to <18 years (55.2%). Effective pain management was most notable upon entering the RR (98.8%), declining slightly at RR discharge and 8 hours postoperatively (94.8%).

The study demonstrated excellent analgesic effectiveness (98.8%; 94.8%; 94.8%; 98.3%), with only 1.2-1.7% of patients reporting pain exceeding a scale of 3. Patient satisfaction with anesthesia services is expected to improve, contributing to enhanced postoperative patient quality of life and a reduction in potential complications.

Regarding age groups, the >1 month-3 years group exhibited higher analgesic ineffectiveness at admission (4.1%) and discharge (14.3%). The 3-<8 years age group showed elevated ineffectiveness at 8 hours postoperative (18.5%) and 24 hours postoperative (7.4%). This might be influenced by anesthesiologists preferring fully conscious (or crying) patients in younger age groups to prevent desaturation in the RR. Furthermore, the use of a single analgesic, paracetamol, was predominant in this age group.

To address this, administering a single paracetamol combined with caudal block in patients aged >1 month-3 years is recommended. Research at Hasan Sadikin Hospital in Bandung supports this approach, indicating a prolonged first analgesic requirement time in pediatric patients undergoing moderate surgeries with caudal block analgesics.[16]

Despite achieving satisfactory results, Dr. Kariadi Hospital's postoperative analgesic administration has not reached 100%, indicating room for improvement toward the goal of a pain-free hospital. Apart from selecting anesthetic drugs for postoperative pain management in pediatric patients, pain assessment should consider age groups to discern responses and pain expression abilities accurately. Careful consideration is

essential, as excessive analgesic administration may lead to adverse effects, incurring additional costs, and reducing patient satisfaction with anesthesia services. Hence, pain management and assessment must align with the patient's condition.

CONCLUSION

The postoperative analgesic use in pediatric patients at Dr. Kariadi General Hospital has demonstrated overall effectiveness based on the type of surgery and age groups. Nevertheless, there is a noteworthy observation concerning a specific patient group receiving only single-dose paracetamol, indicating the need for further review in managing pain for this group.

After postoperative analgesic administration in pediatric patients at Dr. Kariadi General Hospital, the pain scale reveals satisfactory outcomes, with scores ranging from 0 to 4 and averages between 1.73 and 1.9. Despite this, ongoing monitoring and identification of more effective approaches for pain management in pediatric patients, especially in specific groups, remain crucial.

The effectiveness of postoperative analgesics at Dr. Kariadi General Hospital has reached commendable levels, ranging from 94.8% to 98.9%. Although it has not yet attained the ideal 100% target as a pain-free hospital, these achievements signify a commitment to improving postoperative pain management services.

However, it is important to note that the utilization of pediatric pain assessment instruments at Dr. Kariadi Hospital remains inadequate, as it relies solely on the Wong-Baker scale for all pediatric age groups. Future research should consider employing age-appropriate pain assessment tools to ensure more accurate and relevant data for pain conditions within each pediatric age group.

REFERENCES

1. Berde CB, Sethna NF. Analgesics for the treatment of pain in children. New England Journal of Medicine. 2002;347(14):1094–103.
2. Tamsuri A. Konsep dan penatalaksanaan nyeri. Jakarta: Egc. 2007;212.
3. Milewska MM, Horosz B, Ładyko AR. Pain free hospital: recommendation for the acute pain management in Poland. J Pain Relief. 2013;2(120):846–2167.
4. Lasky T, Ernst FR, Greenspan J. Use of analgesic, anesthetic, and sedative medications during pediatric hospitalizations in the United States 2008. Anesth Analg. 2012;115(5):1155–61.
5. Vittinghoff M, Lönnqvist P, Mossetti V, Heschl S, Simic D, Colovic V, et al. Postoperative pain management in children: Guidance from the pain committee of the European Society for Paediatric Anaesthesiology (ESPA Pain Management Ladder Initiative). Pediatric Anesthesia. 2018;28(6):493–506.
6. Kotiniemi LH, Ryhänen PT, Valanne J, Jokela R, Mustonen A, Poukkula E. Postoperative symptoms at home following day-case surgery in children: a multicenter survey of 551 children. Anaesthesia [Internet]. 1997 Oct 1;52(10):963–9. Available from: https://doi.org/10.1111/j.1365-2044.1997.203-az0338.x
7. Rabbitts JA, Palermo TM, Zhou C, Mangione-Smith R. Pain and Health-Related Quality of Life After Pediatric Inpatient Surgery. J Pain [Internet]. 2015;16(12):1334–41. Available from: https://www.sciencedirect.com/science/article/pii/S1526590015008780
8. Bernadeth B, Oktaliansah E, Indriasari I. Efektivitas Analgesik Pascaoperasi pada Pasien Pediatrik di Ruang Pemulihan Rumah Sakit Dr. Hasan Sadikin Bandung Periode Juni–November 2018. Jurnal Anestesi Perioperatif. 2019;7(1):68–84.

9. Fortier MA, Del Rosario AM, Rosenbaum A, Kain ZN. Beyond pain: predictors of postoperative maladaptive behavior change in children. Pediatric Anesthesia [Internet]. 2010 May 1;20(5):445–53. Available from: https://doi.org/10.1111/j.1460-9592.2010.03281.x
10. Yuki K, Daaboul DG. Postoperative maladaptive behavioral changes in children. Middle East J Anaesthesiol [Internet]. 2011;21(2):183–9. Available from: http://europepmc.org/abstract/MED/22435270
11. Deoni SCL, Mercure E, Blasi A, Gasston D, Thomson A, Johnson M, et al. Mapping Infant Brain Myelination with Magnetic Resonance Imaging. The Journal of Neuroscience [Internet]. 2011 Jan 12;31(2):784. Available from: http://www.jneurosci.org/content/31/2/784.abstract
12. Gao W, Lin W, Chen Y, Gerig G, Smith JK, Jewells V, et al. Temporal and Spatial Development of Axonal Maturation and Myelination of White Matter in the Developing Brain. American Journal of Neuroradiology [Internet]. 2009 Feb 1;30(2):290. Available from: http://www.ajnr.org/content/30/2/290.abstract
13. Laguna A, Pusil S, Bazán À, Zegarra-Valdivia JA, Paltrinieri AL, Piras P, et al. Multi-modal analysis of infant cry types characterization: Acoustics, body language and brain signals. Comput Biol Med [Internet]. 2023;167:107626. Available from: https://www.sciencedirect.com/science/article/pii/S0010482523010910
14. Walker SM. Pain after surgery in children: clinical recommendations. Curr Opin Anaesthesiol. 2015;28(5):570.
15. Fitri SYR, Lusmilasari L, Juffrie M. The Indonesian version of the Premature Infant Pain Profile–Revised: Translation and adaptation of a neonatal pain assessment. Int J Nurs Sci. 2019;6(4):439–44.
16. Atmoko AF, Yadi DF, Oktaliansah E. Perbandingan Blokade Kaudal Bupivakain 0, 25% dengan Kombinasi Bupivakain 0, 25% dan Klonidin 1 µg/kgBB terhadap Waktu Kebutuhan Analgesik Pascaoperasi Hipospadia. Jurnal Anestesi Perioperatif. 2018;6(2):120–5.