ORIGINAL ARTICLE

Patterns of Post-operative Analgesic Usage in Adults and Children

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Summary

There appears to be a general tendency towards under-usage of analgesics not only in children but also in adults. The aim of this study was to describe the pattern of analgesic usage in adults and children admitted for major intra-abdominal surgery. All patients who had intra-abdominal surgery at University Science Malaysia Hospital (USM Hospital) from 1st January to 31st March 1995 were included in the study. Children were patients of 12 years and below and adults were patients above 12 years of age. Data including age, sex, weight, type of analgesics used, the number of patients who had analgesics ordered and administered post-operatively were obtained from the patients' medical record. A total of 48 children and 67 adults were studied. Narcotic analgesics were the most common analgesics ordered both in adults (95.5%) and in children (97%). Post-operative analgesics were ordered significantly more often for adults 67 (100%) than for children 33 (69%) ($p<0.0001$). In adults, 70% of patients who had analgesics ordered post-operatively had their analgesics administered, but in children only 39.4% of patients had their analgesics administered ($p <0.001$). The most common route of administration was intramuscular in both adults (95.5%) and children (88%). Analgesics were more likely to be administered in the intensive care units (100%) than in the surgical wards (60%) ($p = 0.049$). Elective or emergency surgery and the time of day when surgery was performed did not affect the frequency of analgesics ordered or administered. In summary, children in this hospital had less analgesics ordered and administered following intra-abdominal surgery compared to adults. The results of this study imply that increased attention should be given to relieve postoperative pain with analgesic drugs in children.

Key Words: Post-operative analgesia, Narcotics, Children

Introduction

Research on pain relief in children is limited mainly because of difficulty in assessing their experience of pain. There is also a general tendency towards under-usage of analgesics both in children and adults.[1,2] Physicians often underestimate the effective dose range, overestimate the duration of action of analgesics and exaggerate the dangers of addiction for medical inpatients.[3] Beyer et al[1] compared patterns of post-operative prescribing and administration of narcotics in 50 children and 50 adults following cardiac surgery and found that children were prescribed fewer potent narcotics and tended to receive inaccurate and frequently inadequate amounts of narcotics. On their fifth post-operative day, 46% of the children and 96% of the adults studied had analgesics available to them. But only four children (6%) received medication compared with 48 (96%) adults. In a comparative study of analgesic usage in children and adults admitted for herniotomy, appendectomy, burns and fractured femur, Schechter et al[2] showed that narcotics were used twice as often in adults. The mean narcotic doses given per day was significantly greater in adults than children especially for conditions requiring a longer hospital stay such as fractures and burns.[2]

There is no evidence to suggest that children respond to or remember painful experiences less well than adults. Infants, children, and even neonates are subject to the same physical and psychologic sequelae of pain as adults.[4,5] Pain causes elevations in heart rate and blood pressure, plus the release of adrenal stress hormones. The metabolic consequences of pain-induced endocrine changes include protein wasting, mobilisation of substrate from energy stores, electrolyte imbalance, and impaired immune function.[6] Provision of adequate analgesia in post-operative patients have been demonstrated to reduce mortality and morbidity rates in adults and neonates.[7,8]

In view of the importance of post-operative analgesia this study was conducted to compare the pattern of analgesic usage following major intra-abdominal surgery in adults and children in University of Science Malaysia Hospital.

Materials and Methods

Subjects and sampling

All patients who had major intra-abdominal surgery at University Science Malaysia Hospital (USM Hospital) from 1st January to 31st March 1995 were included in the study. Major intra-abdominal surgery included bowel resection, appendicectomy, colostomy, cholecystectomy and laparotomy. Patients were excluded if they had obstetrical or gynaecological operations, died within seven post-operative days or had been prescribed analgesics for pain prior to the operation. In patients with multiple surgical operations the first surgical operation was chosen for the study. Children were patients 12 years or below and adults were patients above 12 years of age.

Data collection

The medical records of patients undergoing major intra-abdominal surgery during this period were retrieved from the hospital medical records. Data obtained from the patient's medical record included age, sex, weight, type of analgesics used, and the number of patients who had analgesics ordered and administered post-operatively.

Data analysis

In this investigation, data were analysed through the use of descriptive statistics and chi square test to compare differences between proportions. Statistical analysis was performed using the EPI 6.0 (Centres for Disease Control, Atlanta) software for personal computers.

Results

Forty eight children of mean age of 3 years (range 1 day to 12 years) and 67 adults of mean age 35.8 years (range 13 to 79 years) were studied.

Analgesics ordered and administered

The pattern of analgesics ordered post-operatively for all patients was as follows: none, 15 (13%), non-narcotic analgesics, 4 (3.5%), narcotic analgesics, 90 (78.3%), both non-narcotic and narcotic analgesics, 6 (5.2%). The patients for whom no analgesics were ordered were children below 12 years of age. Analgesics were ordered significantly more often for adults 67 (100%) than for children 33 (69%) ($p<0.0001$). Analgesics were more frequently prescribed for children above 1 year age (70%) than for children below 1 year of age (50%) but this was not statistically significant ($p = 0.67$). Patients never received epidural or caudal anaesthesia intraoperatively and local wound infiltration of anaesthetics at any time.

Table I shows the type of analgesics ordered for adult and children following intra-abdominal surgery. Narcotics were the most common analgesic ordered both in adults (95.5%) and in children (96.9%). In adults, 70% of patients who had analgesics ordered post-operatively had their analgesics administered compared with only 39.4% in children ($p <0.001$).

In the 100 patients who had analgesics ordered 37 (37%) had them ordered to be given PRN (pro re nata) and 63 (63%) on a regular basis. Of the 63 patients in whom analgesics were ordered to be given regularly 19 (30.2%) had their analgesics administered PRN; 17 (34.7%) adults and two (14.3%) children ($p = 0.19$).

Table I
Type of analgesics ordered for adults and children following intra-abdominal surgery

Type of Analgesics	Adult n (%)	Children n (%)
Morphine	0 (0)	3 (9)
Fentanyl	1 (1.5)	0 (0)
Pethidine	63 (94)	29 (87.9)
Diclofenac sodium	3 (4.5)	0 (0)
Paracetamol	0 (0)	1 (3)
Total	**67 (100)**	**33 (100)**

Route of analgesic administration

The routes of analgesic administration post-operatively were as follows: intramuscular 64 (95.5%) adults, 29 (88%) children; intravenous 2 (3%) adults, 3 (9%) children; epidural 1 (1.5%) adult; and others 1 (3%) children. The were no significant differences in the selection of route of administration for adults and children ($p = 0.23$).

In the intensive care units (general intensive care unit and neonatal intensive care unit) patients who had analgesics ordered had their medications administered (5 ordered and 5 administered). However in adults and paediatric surgical wards only 60% of patients who had analgesics ordered had their medications administered (95 ordered and 55 administered). Analgesics were significantly more likely to be administered in intensive care units than in surgical wards ($p = 0.049$).

There was no significant difference between the proportion of patients who had analgesics ordered during elective (81%) or emergency surgery (89%) ($p = 0.41$). The time of day when the operation was performed did not affect the pattern of analgesics ordered ($p = 0.45$) or administered ($p = 0.31$). In the first post-operative day 72.3% of adults and 69.2% of children who had analgesics ordered received their medications. However in the second post-operative day only 14.9% of adults and 7.7% of children who had analgesics ordered received their medications. One adult patient continued to receive analgesics until the eighth post-operative day and one child received analgesics untill the fourth post-operative day.

Discussion

This study demonstrates that children received less analgesics than adults post-operatively for comparable pathophysiological problems. It documents that adults with the same pathophysiologic problems were treated differently from children as regards to analgesic administration.

In the present study, significant differences were found between adults and children on both the prescription and administration of analgesics after major intra-abdominal surgery. Postoperative analgesics were prescribed more often for adults than children. Of the total 115 patients studied 15 patients had no postoperative analgesics prescribed and all of them were children. Among adults with analgesics prescribed 70% had their analgesics administered compared to only 39.4% in children. This illustrates that children not only had post-operative analgesics prescribed less frequently than adults but even when prescribed, analgesics were less likely to be administered.

There was no difference in the prescription of narcotic analgesics in adults and children. This contrasts with other studies which showed that narcotic analgesics were more often prescribed for adults than children.[1,2,3] In patients following cardiac surgery potent narcotics (meperidine and morphine) were prescribed in 72.6% of adults but only 57.6% of children.[1] Similarly in a comparison of hospital analgesic usage in children and adults, narcotics were ordered for all adults but only 87% of children.[2]

Most prescriptions for post-operative analgesia (63%) were ordered to be given at regular intervals in our patients but 37% of these patients had their analgesics given as necessary or PRN (pro re nata) basis by the ward nurses. Children were not more likely to have their medications given PRN than adults. Medications

were given on a PRN basis more often in the surgical wards than in the intensive care unit. Nurses are thought to believe that children do not experience pain as adults do and that attention to their signs of discomfort is not as critical.[9] There also appears to be significant concern about addiction and narcotic side effects among the nursing staff and physicians.[3] Such fears may inhibit the dispensing of adequate pain mediation. However, in this study nurses did not administer analgesics on a PRN basis to children, and addiction to narcotics in children does not seem to have been a great concern among doctors as the frequency of narcotic prescription was similar in adults and children.

Even though most of the narcotic analgesics prescribed can be administered intravenously, most narcotics were ordered to be administered intramuscularly in our patients. The intravenous route offers the advantages of complete bio-availability, immediate effect, and lack of discomfort with administration[10]. Children often suffer in silence to avoid another painful intramuscular injection,[9] the distress of which is as bad as any aspect of the perioperative experience.[9] Intravenous continuous infusions can also be used to provide steady analgesic levels.[10] Almost all children undergoing painful surgery have an intravenous line postoperatively, and this could be utilised more often for administration of post-operative analgesics.

Bayer et al[1] reviewed a number of hypotheses to explain the discrepancy between post-operative pain management in adults and children. Among the reasons were a) children feel less pain, b) children do not communicate effectively the pain that they feel, c) health professionals are reluctant to administer analgesics to children due to the fear of possible side-effects, and d) less medication is required for paediatric pain relief because analgesics may be distributed, metabolised, and eliminated differently in children than in adults.

The question of whether there are biologic differences in the way children and adults perceive pain is unanswered. Although early research emphasising incomplete myelinisation implied that children responded differently to noxious stimulation and questioned whether they experienced pain, most recent data using spectrographic analysis of infant cries,[11] physiologic responses to circumcision,[5] and standardised behavioural observation of children undergoing medical procedures[12,13] all report that infants and young children clearly experience discomfort. Jay, et al[12] found that children's distress during medical procedures was inversely proportional to their age suggesting a lower threshold for pain in younger than older children. Therefore the notion that children do not experience pain because of neurologic immaturity appears to have limited support in the current literature.

In the light of difficulties in measuring pain in children, one cannot unequivocally state that the paediatric patients in this study suffered undue discomfort as a result of under-medication. Nevertheless health professionals must consider the possibility that children may feel pain as intensely as adults and that the primary difference between the two may be in the accuracy and maturity of their expressions of pain. Thus, health professionals should respond to children proactively and humanistically in the anticipation of relief of their pain. Analgesic administration should be the first line of defence against the acute pain associated with major surgery. Non-pharmacological measures are also important but should be used to supplement pharmacological interventions.

In summary children in this hospital not only had less analgesics ordered but also had less analgesics administered than adults following major intra-abdominal surgery. There was also a suggestion that children below one year of age had less analgesics prescribed compared to children above one year of age. The present data suggests that large differences still exist in the management of children's post-operative pain compared to adults in this hospital. The results of this study imply that increased attention should be given to relief of post-operative pain with analgesic drugs in children.

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