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RESEARCH

Acute postoperative pain in 1 231 patients at a developing country referral hospital: incidence and risk factors

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Background: Postoperative pain is poorly studied in developing countries. At a Western Cape referral hospital, it was aimed to determine the incidence of acute postoperative pain, to identify populations associated with a higher risk thereof (in order to guide resource allocation) and to investigate whether inexpensive analgesic modalities are currently utilised maximally.
Methods: Patients completed visual analogue scales 24 h after surgery for pain immediately after surgery, maximum pain since surgery and current pain. The incidence of moderate or severe pain and median pain scores were calculated for each scale and for different patient populations. Post hoc logistic regression was performed. Morphine prescriptions were compared with the actual administration thereof.
Results: Of 1 231 patients, 62% indicated their maximum pain as moderate or severe. Procedures with the highest incidences were caesarean section and lower limb orthopaedic surgery (> 80%). Younger age, female gender, emergency surgery, and surgery to the abdomen and lower limbs were associated with higher incidences. Patients experiencing moderate or severe pain received 46% of their prescribed morphine.
Conclusion: In this institution, the incidence of postoperative pain is high as expected. Associations with postoperative pain are identified, which may guide resource allocation. At least one low-cost analgesic modality is currently underutilised.

Keywords: analgesia, developing country, health resources, incidence, postoperative pain, risk factors

Introduction

Inadequately treated postoperative pain is a prevalent phenomenon worldwide that adversely affects patient experience and outcome.[1–7] In a resource-limited environment with an expected high incidence of postoperative pain it is necessary to fully utilise basic analgesic modalities and to reserve more costly advanced methods for those who need it most. For this reason the incidence and risk factors associated with a higher incidence of postoperative pain need to be identified.

Previous studies have revealed a high incidence (41–61%) of moderate or severe postoperative pain in developed countries.[2–4,8] Most studies only reported on the overall incidence of postoperative pain or compared different methods of analgesia. Few studies that aimed at identifying high-risk groups for practical clinical use were found.[9,10] In addition, very little is known about the incidence and associations of postoperative pain in developing countries.[6,11,12]

The aim of this study was to explore the incidence of moderate or severe pain during the first postoperative 24 h and to identify specific groups of patients who require more intensive analgesic efforts, in a large referral hospital situated in a developing country. In addition, the discrepancy between prescribed intramuscular morphine and the actual administration thereof by nursing staff was investigated in patients experiencing moderate or severe pain. Postoperative morphine administration plays only a limited part in the analgesic strategy, but monitoring it could serve as an indicator of whether less expensive modalities are utilised to their maximum. The knowledge obtained from this study may be used to utilise the available resources appropriately and thereby improve postoperative patient care.

Methods

Institutional review board approval was obtained (N11/07/211) for this study. Over a 3-month period, patients who underwent surgery in the main theatre complex of Tygerberg Hospital during office hours and remained hospitalised for at least 24 h were interviewed on the day after surgery by a single nurse appointed for this purpose. Patients who received their surgery in the morning were interviewed the following morning and afternoon cases were interviewed during the following afternoon. Exclusion criteria were age under 12 years, visual impairment and an inability to understand or complete a visual analogue scale (e.g. intubated and sedated patients).

During the interview, informed consent was obtained and the patient was asked to complete a questionnaire, available in all three local languages, that was composed of three visual analogue pain scales (VAS) with the following questions:

(1) Please mark the point on the following line that best describes your pain **immediately after your surgery**.
(2) Please mark the point on the following line that best describes the **worst pain you experienced after surgery.**
(3) Please mark the point on the following line that best describes your **pain at this moment**.

Additionally, the following data were collected from the anaesthetic record: age, gender, American Society of Anaesthesiologists preoperative classification (ASA), procedure, anatomical site of surgery, surgical speciality, and whether general anaesthetic, regional techniques and patient-controlled analgesia (PCA) were utilised.

The visual analogue pain scale was categorised as previously validated: no pain (0–5 mm), mild (6–40 mm), moderate (41–74 mm) and severe pain (75–100 mm).[13,14] Incidences of moderate and severe pain were calculated for pain immediately after surgery, maximum pain and pain at time of interview. Patient groups, according to the collected data, were compared with regard to the maximum pain and pain at time of interview. Surgical procedures were grouped together in 32 procedure groups for comparison.

The following statistical methods were used to investigate possible differences in postoperative pain between the different populations.

(1) Incidence of moderate or severe pain (VAS > 40 mm) with *p*-values obtained by Pearson's chi-square test. (An alpha of 0.05 was regarded as statistically significant.)
(2) Median pain scores with interquartile ranges (IQR).
(3) Post hoc logistic regression to calculate odds ratios for the occurrence of moderate or severe pain.

An audit on morphine prescription and the actual administration thereof was also performed to determine whether suboptimal use of this less expensive modality could have contributed to inadequate analgesia. For patients who reported moderate or severe pain on their second or third VAS and did not receive regional anaesthesia or PCA postoperatively, average dose intervals at which morphine was administered were calculated (elapsed postoperative time divided by number of dosages administered) and compared with prescribed dose intervals.

Results

Demographics

This study included 1 231 patients of whom 660 (54%) were females and 571 (46%) males. Their mean age was 44 years. Regional procedures were done in 502 (41%) of the patients and 850 (69%) received general anaesthesia. Most patients who passed the exclusion criteria were classified ASA 1 or 2 (81%) and 241 (20%) patients received emergency surgery (Table 1). A median period of 23 h (IQR 20–25 h) elapsed from when the patient arrived in the recovery unit until completion of the questionnaire.

Incidence of pain

Of the 1 231 patients, 763 (62%) indicated their maximum pain to be moderate or severe; 312 (25%) moderate and 451 (37%) severe. For the time immediately after surgery, 156 (13%) patients retrospectively indicated moderate or severe pain and 974 (79%) indicated that they had no pain. Moderate pain was indicated by 280 (23%) patients and severe pain by 89 (7%) patients at the time of the interview.

Comparison of patient populations to identify risk factors

The incidences of moderate or severe pain for different groups are indicated in Tables 1, 2 and 3.

Emergency surgery, younger age and female gender were associated with an increased incidence of moderate or severe pain, on the scales for both maximum pain and pain at time of interview. The anatomical sites of surgery with the highest incidence of moderate or severe pain were lower limb and abdomen (Table 2).

Caesarean section was the procedure with the highest incidence of inadequate analgesia, followed by open reduction and internal fixation (ORIF) of the lower limb, sloughectomy and laparotomy. Obstetric patients also reported the highest incidence of moderate or severe pain immediately after surgery (39%) followed by trauma surgery (23%) and burns (21%).

A post hoc logistic regression was performed to identify independent risk factors for maximum pain being reported as moderate or severe. Age was entered as numerical data and anatomical site was compared with head surgery. Younger age, female gender, emergency surgery and surgery performed on

Table 1: Demographics and descriptive statistics

Variable	*n*	%	Maximum pain				Pain at time of survey			
			n ≥ 40 mm	%>40 mm	*p*-value	Median VAS (IQR)	*n* ≥ 40 mm	%>40 mm	*p*-value	Median VAS (IQR)
All	1231	100%	763	62%		55 (25–85)	369	30%		25 (0–48)
Age					< 0.001				0.008	
< 45	655	53%	455	69%		70 (35–92)	221	34%		30 (0–50)
45–59	322	26%	191	59%		50 (20–80)	85	26%		25 (0–45)
> 59	254	21%	117	46%		40 (0–70)	63	25%		10 (0–40)
Gender					0.046				0.109	
Male	571	46%	337	59%		52 (20–85)	184	32%		25 (0–50)
Female	660	54%	426	65%		60 (30–87)	185	28%		25 (0–45)
Emergency					< 0.001				0.009	
Yes	241	20%	179	74%		68 (40–86)	89	37%		32 (1–50)
No	990	80%	584	59%		50 (20–85)	280	28%		21.5 (0–45)
ASA*					0.009				0.077	
1	430	35%	292	68%		65 (30–88)	145	34%		30 (0–50)
2	567	46%	331	58%		50 (20–85)	156	28%		22 (0–45)
3–5	190	15%	118	62%		55 (25–84)	52	27%		21.5 (0–45)

Notes: The incidences of patients reporting moderate or severe pain (visual analogue pain scale ≥ 40 mm) as well as median VAS score and inter-quartile ranges are shown for two pain scales.
*ASA not documented on 44 charts; 25th = 25th quartile; 75th = 75th quartile.

Table 2: Incidence of moderate or severe pain according to anatomical site

Variable	*n*	Maximum pain			Pain at time of survey		
		n ≥ 40 mm	% ≥ 40 mm*	Median VAS (IQR)	*n* ≥ 40 mm	% ≥ 40 mm†	Median VAS (IQR)
Anatomical site							
Lower limb/hip	345	246	71%	70 (40–93)	138	40%	35 (10–50)
Abdominal	390	275	71%	68 (35–90)	139	36%	30 (0–50)
Spine	53	33	62%	60 (22–91)	16	30%	30 (0–50)
Upper limb/shoulder	85	52	61%	60 (17–80)	20	24%	20 (0–40)
Head	87	43	49%	40 (0–75)	12	14%	10 (0–30)
Pelvic	92	42	46%	30 (0–80)	14	15%	1 (0–28)
Neck	47	21	45%	40 (0–60)	9	19%	5 (0–35)
Thorax	97	39	40%	36 (0–63)	17	18%	5 (0–34)
Eye	35	12	34%	30 (0–55)	4	11%	2 (0–30)

Notes: The incidences of moderate or severe pain (VAS ≥ 40 mm) and the median VAS score with inter-quartile ranges for maximum pain and pain at time of survey are shown for patients who had surgery at different anatomical sites. *N* = number of patients.
*$p < 0.0001$.
†$p < 0.0001$.

the abdomen and lower limbs were identified as statistically significant independent risk factors (Table 4).

Regional techniques

Single-shot peripheral nerve blocks to the limbs were done on 31 patients. Thirty (97%) reported no pain immediately after surgery, but 18 (58%) reported moderate or severe pain thereafter. (Day surgery patients were excluded as per initial criteria.)

Eighteen patients who underwent abdominal surgery received nerve blocks. These consisted of transversus abdominis plane (TAP) blocks, ilioinguinal blocks, paravertebral blocks and rectus sheath blocks. Only one (6%) of these patients reported any pain immediately after surgery, while 11 (61%) developed moderate or severe pain later.

Spinal anaesthesia was used in 372 patients. Sixty-four (17%) reported moderate or severe pain immediately after surgery and 265 (71%) during the time until interview.

Morphine administration

Intramuscular morphine was prescribed in 978 of the 1 231 (79%) patients and 744 patients received at least one dose. The dose prescribed was 10 mg in 78% of cases and less in the remainder. Pro re nata (prn) orders appeared on 37% of the prescriptions. The prescribed dosing intervals were 4 or 6 hourly in 90% of cases, with the rest ranging from 1 to 12 h.

In the 577 patients who reported moderate or severe pain and did not receive a postoperative epidural, PCA, peripheral nerve block or intravenous morphine, only 46% of the prescribed morphine was administered. The mean dose interval prescribed in these patients was 5 h and 18 min (4.5 times per 24 h). Some 14% of these patients never received any morphine and, in those that did, the mean dose interval was 13 h and 16 min (1.8 times per 24 h). That is 2.7 administrations less than prescribed. Thirty percent of these prescriptions included a prn instruction, but the discrepancy stayed identical when these were excluded.

Patient-controlled analgesia (PCA) was used in 54 patients. Their incidence of moderate or severe pain was 61% for worst pain, 39% at the time of interview and 13% immediately after surgery.

Discussion

Incidence of pain

A meta-analysis of 165 studies (20 000 patients) revealed that 30% and 11% of patients suffered moderate to severe and severe postoperative pain respectively.[3] In a Netherlands hospital moderate or severe pain was reported by 41% of patients on the day of surgery and 30% on the following day.[2] In the United Kingdom a study performed in 2012 revealed that 68% of postoperative patients experienced pain, of which 38% reported severe pain and 52% moderate pain.[4]

The incidence of acute postoperative pain in our single-centre developing country referral hospital was high in comparison with developed countries even though patients from lower income groups have a tendency to underreport their pain.[15] In 62% of patients, moderate or severe pain occurred at least once during the first postoperative day. Reasons that could have contributed are infrequent administration of ward analgesia and limited access to advanced modalities. At the time of the survey there was no acute pain team that visited the patients routinely in the wards and pain monitoring was still being done informally. Direct comparisons between institutions are not always relevant though, due to differing spectra of patients and procedures.

Pain at time of survey compares better with published data, with 30% of the patients reporting moderate or severe pain.[2–4] The incidence of moderate or severe pain immediately after surgery was low at 13%, although this result may have been influenced by amnesia for the immediate postoperative period since the VAS was used retrospectively. Patients leaving the operating room in a relatively good analgesic state may leave anaesthesiologists under the misconception that their patients are not experiencing unacceptable levels of postoperative pain.

Comparison of patient populations to identify risk factors

To improve postoperative analgesia, it is necessary to predict which patients will need a more aggressive approach. In this regard the following risk factors were identified: younger age, female gender, emergency surgery, open abdominal surgery, orthopaedic procedures on the lower limbs and sloughectomies.

Table 3: Incidence of moderate or severe pain according to similar procedures

Procedure	*n*	Maximum pain			Pain at time of survey		
		n ≥ 40 mm	% ≥ 40 mm*	Median VAS (IQR)	*n* ≥ 40 mm	% ≥ 40 mm†	Median VAS (IQR)
Caesarean section	97	84	87%	80 (60–100)	37	38%	35 (5–50)
Hip/femur/knee ORIF‡	52	44	85%	74.5 (50–94.5)	23	44%	32.5 (7–50)
Ankle ORIF	59	47	80%	88 (50–100)	29	49%	40 (15–60)
Tibia ORIF	40	32	80%	76 (52.5–100)	23	58%	49.5 (24–72.5)
Abdominal other	42	33	79%	68 (46–85)	25	60%	50 (15–57)
Sloughectomy	38	29	76%	70 (45–80)	13	34%	25.5 (13–50)
Laparotomy	58	43	74%	74 (40–99)	25	43%	35 (4–53)
Orthopaedic non-ORIF	30	22	73%	80 (40–93)	10	33%	37.5 (12–50)
Hysterectomy	51	36	71%	68 (35–90)	15	29%	30 (10–45)
Vascular	26	18	69%	58.5 (28–86)	10	38%	35 (5–50)
Laparotomy major	27	18	67%	68 (35–80)	10	37%	40 (1–50)
Upper limb ORIF	38	25	66%	70 (20–90)	8	21%	17 (0–40)
Amputation	28	18	64%	55.5 (40–80)	7	25%	31.5 (6–42.5)
Debridement	58	37	64%	54 (31–80)	19	33%	30 (0–50)
Replacement knee/hip	30	19	63%	63.5 (25–88)	15	50%	42.5 (10–50)
Laminectomy/fusion	53	33	62%	60 (22–91)	16	30%	30 (0–50)
Laparoscopy	37	21	57%	60 (20–86)	10	27%	22 (0–42)
Laparoscopy gynaecology	36	20	56%	50 (32.5–70)	5	14%	13.5 (0–35)
SSG	36	20	56%	50 (35–68.5)	9	25%	30 (0–42)
Cardiothoracic	31	16	55%	48 (15–80)	3	32%	15 (0–48)
Perineal	29	17	55%	50 (20–80)	10	10%	16 (0–35)
Urological extra-abdominal	14	7	50%	58.5 (0–100)	3	21%	0 (0–20)
Plastic surgery	30	14	47%	37.5 (20–85)	3	10%	10 (0–25)
ENT surgery§	26	12	46%	37.5 (0–50)	4	15%	15 (0–30)
Minor	47	21	45%	35 (0–60)	6	13%	1 (0–34)
Hernia repair	36	16	44%	40 (19–75)	8	22%	16.5 (0–40)
Neck non-spine	23	9	39%	38 (10–65)	4	17%	0 (0–39)
Neurosurgery non-spine	23	9	39%	30 (0–50)	4	17%	10 (0–35)
Ophthalmology	35	12	34%	30 (0–55)	4	11%	2 (0–30)
Breast	25	8	32%	15 (0–54)	3	12%	0 (0–20)
Mastectomy	41	13	32%	30 (0–45)	4	10%	4 (0–29)
TURBT/TURP‖	35	10	29%	12 (0–50)	4	11%	0 (0–15)

Notes: The incidences of moderate or severe pain (VAS ≥ 40 mm) and the median VAS score with inter-quartile ranges for maximum pain and pain at time of survey are shown for patients with similar procedure. *N* = number of patients.
*p-value < 0.0001.
†p-value < 0.0001.
‡Open reduction and internal fixation.
§Ear nose and throat.
‖Transurethral resection of bladder tumour or prostate.

Retrospective detection of risk factors does not prove causation, but it does reveal associations present in the specific setting that may be useful to guide attempts at improvement. Caesarean section patients could, for example, have had more pain because they were young females, done under spinals with inadequate systemic analgesia or because of the nature of the surgery. Even though one can only speculate as to the cause, it remains useful to know that there is a problem in this population that needs to be addressed or investigated urgently.

In agreement with a previous study, younger females had a higher incidence of moderate or severe pain, although differences in procedures (e.g. caesarean sections vs. transurethral resection of the prostate [TURP]) could have contributed to this result.[2]

Patients who received emergency surgery had a much higher incidence of inadequate analgesia when compared with their elective counterparts in our and a previous study.[4] During emergency surgery the lack of premedication, inadequate preparation and other seemingly more important clinical challenges may take the focus away from measuring pain and administering analgesia. Preoperative pain has also been shown to be a predictor of worse postoperative pain.[2]

Table 4: Post hoc logistic regression

Variable	OR	95% CI
Age	**0.976**	**0.968–0.984**
ASA 1 vs. ASA > 1	0.981	0.731–1.315
Emergency vs. non-emergency	**1.527**	**1.085–2.149**
Female vs. male	**1.414**	**1.084–1.845**
Anatomical site vs. head		
Lower limb	**3.133**	**1.876–5.231**
Abdominal	**2.257**	**1.373–3.710**
Spine	1.994	0.968–4.108
Upper limb	1.607	0.844–3.061
Neck	1.108	0.529–2.322
Pelvic	0.989	0.529–1.849
Thorax	0.783	0.416–1.474
Eye	0.469	0.197–1.118

Notes: Post hoc logistic regression demonstrating odds ratios (OR) with 95% confidence intervals (CI) for having a maximum pain of moderate or severe. Anatomical sites were compared with surgery on the head.

Caesarean section stood out as the procedure with the highest incidence of moderate or severe pain during the first 24 postoperative hours (87%) and in the immediate postoperative period, illustrating the temporary effect of spinal anaesthesia. It is critical that alternative analgesia takes effect by the time the spinal anaesthesia wears off. NSAIDs and TAP blocks were occasionally used, but systemic opiates were prescribed in the majority of these patients. One contributing factor could have been that most patients received their first morphine dose as an intramuscular dose and not via the more efficient way of titrating opiates intravenously in the recovery unit. Intravenous paracetamol and intrathecal morphine (which necessitate a higher level of postoperative care) are used with good effect in other institutions, but this is unfortunately excluded for routine use at our institution due to the financial implications.

Different open reduction and internal fixation procedures on the lower limbs followed, with 80–85% of patients reporting moderate or severe pain. Spinal anaesthesia was once again the modality used in the majority (75%) of cases. Patients receiving knee or hip replacement had a lower incidence (63%) possibly due to the more frequent use of PCA or epidurals (40% vs. 4.6%).

Sloughectomies also had a high incidence of inadequate analgesia (76%). Burns patients are known to develop opiate tolerance and therefore some anaesthesiologists also added intraoperative ketamine and regional techniques.

Regional techniques

The four procedures with the highest pain incidence were mostly done under spinal anaesthesia (81%). Only 17% of patients who received spinal anaesthesia reported moderate or severe pain immediately after surgery, while 71% reported it thereafter. Spinal anaesthesia may wear off over a short period and severe pain may follow if alternative analgesia is not established in time. At the time of this survey, establishment of systemic analgesia was often left to the ward staff, who are only allowed to administer morphine intramuscularly.

Single-shot peripheral and abdominal nerve blocks resulted in a low incidence of pain immediately after surgery, but once again the patients still had a high incidence of moderate or severe pain thereafter. The use of indwelling perineural catheters can be utilised to extend analgesia further into the postoperative period, but this is only feasible when an acute pain service with pain ward rounds is available.[11]

Morphine administration

The underlying cause of inadequate analgesia may be multifactorial, but the most basic question we need to ask is: 'Are our patients getting their prescribed medications regularly enough?' Postoperative morphine administration plays only a limited part in the analgesic strategy, but monitoring it could serve as an indicator of whether less expensive modalities are utilised to their maximum and indicate the possible need for further in-depth investigation or need for improvement.

Owen et al. showed that pro re nata medications were effective when given timeously, but due to too long dosing intervals there were frequent reports of breakthrough pain. In their study, mean frequency of intramuscular opiate administration was 2.7 administrations per 24 h or once every 8 h and 53 min. The majority of patients waited until they had severe pain before asking for analgesia and then expected it to be administered promptly.[16] In a large national survey in France subcutaneous morphine was prescribed in 35% of patients of whom 88% received it at an interval of 6 h or less and 8% never received morphine.[7] In a public teaching hospital in Melbourne, Australia, the percentage of fixed analgesic administered was 65% over the first 24 postoperative hours.[17]

In our institution, the discrepancy between the dose intervals at which morphine was prescribed and that at which it was administered was substantially worse than what was previously reported.[16] A possible contributing factor could be that our nursing staff are unaware of the fact that a substantial number of patients experience severe pain, as there is no routine documentation with standardised pain scales. Some studies have revealed that nurses and doctors underestimate patients' pain or desire for analgesia and pain monitoring programmes, consisting of staff education and pain documentation with numeric pain scales, have been shown to improve the compliance with administration of analgesia.[6,11,15,17–20] In Europe it is now becoming common practice to document pain scores as part of the routine postoperative observations. This could provide a way to make nursing staff more aware of the problem as patients tend to underreport their pain until it becomes unbearable.[7,15,16] An excessive nursing workload due to low staff numbers in addition to the paperwork needed for scheduled drug administration and the fear of opiate abuse may also have contributed.

In our study, patients who received the same procedures differed widely in the degree of pain they experienced postoperatively. Most of the procedure groups had patients reporting no pain during the whole postoperative period and those who reported severe pain. The wide inter-patient differences underline the role of the ward staff to monitor and interpret the analgesic needs of patients in order to administer analgesia appropriately.

In patients who received PCA, the incidence of moderate or severe pain was higher than in the rest of the population at the time of interview. Although this may partially be explained by the fact that PCA pumps are reserved for those in whom high levels of pain are expected, it is still very concerning and mandates revision of PCA use in our institution. Since the rate at which drugs can be

administered via PCA is limited, it cannot be expected that patients will be able to bring severe pain under control with PCA. Analgesia needs to be established using bolus administration while the patient is being monitored and thereafter PCA may be used for maintenance of analgesia. The high incidence of pain at 24 h suggests that the patients are not using their PCA regularly enough. Patients need to be educated to start administering morphine before pain becomes unbearable.

Conclusion

The incidence of postoperative pain in this developing country referral hospital is high, as expected. The immediate postoperative period seems to be less of a problem, with moderate to severe pain developing thereafter. Cost-effective ways to improve analgesia need to be found. Targeting populations with a higher incidence and fully utilising basic analgesic methods can assist us in this regard.

Younger age and emergency surgery are shown to be associated with moderate or severe postoperative pain in this institution. Open abdominal (especially caesarean sections), orthopaedic (especially ORIF of the lower limbs) and burns surgery were associated with the most pain. These populations must now be further investigated and enhancements made. Retrospective detection of risk factors does not imply causation, but only identifies associations in this specific institute. Several confounding factors, including variation in intra- and postoperative analgesia could have affected our results. Even though the exact cause may be unclear, the results can be used in this setting to identify populations where further investigation and attempts at improvement can be made.

Patients who received spinal anaesthesia or single-shot nerve blocks had a high incidence of moderate or severe pain after termination of the block. When continuous infusions are not feasible, analgesic strategies should be carefully planned and administered pre-emptively. Breakthrough pain should be treated by carefully titrated intravenous morphine in the recovery room and subcutaneous doses used for maintenance only.

Infrequent administration of basic analgesia could have contributed to the high incidence of postoperative pain. Wide variability in pain incidence within similar procedures highlights the role of patients to report and ward staff to identify the patients' need for analgesia and to administer the analgesia timeously. Ward staff should be educated to be more aware of the high incidence of postoperative pain and administer analgesia more regularly.

The monitoring of pain severity should be done as part of the routine observations and be documented by using standardised pain scales. Patients should be encouraged to report their pain early and not only when it becomes unbearable.

The role of anaesthesiologists outside the operating theatre is emphasised by the results. An acute pain service would facilitate patient and staff education and provide follow-up on PCA and peripheral nerve catheters.

Postoperative pain at this institution is still a real problem and needs our closest attention. This study demonstrates a possible underlying problem with the administration of prescribed analgesia and reveals populations currently associated with greater levels of postoperative pain at this institution.

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