

## ORIGINAL RESEARCH

# Acute postoperative pain management at a tertiary hospital in Addis Ababa, Ethiopia: A prospective cross-sectional study

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## Abstract

### Background

The success of a surgical procedure is determined by many factors; - including appropriate pain control. Management of post-operative pain reduces suffering and leads to earlier mobilization, promotes wound healing and recovery, shortens hospital stay, reduces hospital costs, and increases patient satisfaction.

Although the mechanisms of pain increasingly well understood, and novel, safe analgesics and techniques of anaesthesia are introduced, the level of postoperative pain relief is still unsatisfactory. Post-operative pain control regimens are not standardized; rather, tailored to the needs of the individual patient.

### Methods

A prospective cross-sectional study was conducted October 1-31st 2016. Predesigned structured data collection format used to abstract the medications provided to each patient and to interview patients. We used convenience sampling technique. Post-operative pain (POP) and patients' satisfaction with pain relief scores were assessed by using pain numerical rating scales. Pain assessment was done after 24hours of surgery and at discharge or fifth POD. We used descriptive analysis to determine the degree of control of pain and carried out bivariate and multivariable analysis to determine factors affecting the level of pain control and patient satisfaction using SPSS version 20.

### Results

Five hundred & twenty-four patients were included in the prospective study. Two hundred sixty-one patients (49.7%) were found to have moderate to severe pain at first POD and 138 patients (26.3%) had moderate to severe pain during discharge or at fifth POD. Four hundred eighty-three patients (92.2%) were satisfied with POP pain management. Emergency procedures & duration of surgery above one hour were found to be independent risk factors for POP pain while educational status above secondary school was independently associated with POP management satisfaction.

### Conclusions

The study showed postoperative pain management is still a challenge in our setting. Most patients developed moderate to severe postoperative pain while they are on pain management but reported a high level of POP pain satisfaction.

**Keywords:** postoperative pain, analgesia, Ethiopia

## Introduction

The success of a surgical procedure is dependent on many factors, including appropriate pain control, early ambulation and rehabilitation after surgery. These, directly translates into three relevant elements i.e. hospitalization length, costs as well as patient satisfaction(1,2). There are many causes

of post-operative pain; therefore, various approaches to post-operative analgesia should be used to improve pain relief and reduce the number of complications (1-4).

The effective relief of pain is of the utmost importance to while treating patients undergoing surgery. Poorly managed postoperative pain can lead to complications and prolonged

rehabilitation. Uncontrolled acute pain is associated with the development of chronic pain with reduction in quality of life. Appropriate pain relief leads to shortened hospital stays, reduced hospital costs, and increased patient satisfaction (2). Hence, monitoring of pain relief is increasingly becoming an important measure of the quality of postoperative care. The goal for postoperative pain management is to reduce or eliminate pain and discomfort with a minimum of side effects (2, 3, 5-7).

Although the mechanisms of pain are increasingly well understood, novel and despite the fact that safe analgesics and techniques of anesthesia are introduced; the level of post-operative pain relief even in the developed countries is still unsatisfactory (1-5). Progress in acute pain management has demonstrated that effective pain relief can be achieved with a range of inexpensive drugs and treatments, yet the vast majority of patients in less developed areas of the world have little or no access to even the most limited therapies that could alleviate their suffering from acute or chronic pain (1-5)

Given the large disparity between the amount of pathophysiologic data on the mechanisms responsible for acute pain and the subsequent translation of this scientific evidence into clinical practice, the most immediate way forward is to begin by routinely implementing procedure specific, evidenced-based pain management protocols in the perioperative period.

Comprehensive data about the incidence and management of pain are lacking, but it is clear that, even when patients do access health care facilities, pain relief still seems to be poor. Very few papers evaluated these challenges in the developing countries(2,3,6). Hence the objective of this paper was to evaluate the level of postoperative pain, factors affecting post-operative pain management & level of post-operative pain management satisfaction.

Inadequate (ineffective) post-operative pain control can lead to adverse consequences for patients, i.e., the development of chronic pain, immunosuppression, poor healing of surgical wounds, and adrenergic activation and its consequences in the form of coronary incidents or gastrointestinal obstruction. Moreover, lack of mobility can result in thrombosis and embolism. These complications affect hospital functioning, which leads to decreased patient satisfaction, a worse reputation for the hospital. Prolonged hospitalizations, higher incidence of re-surgeries and re-admissions, and higher costs for care and treatment are outcomes of poor management of pain. Higher numbers of claims and compensations are also seen (7-10). The highest attainable standard of health is enshrined in the 1948 Universal Declaration of Human Rights as a fundamental right of every human being. Relief from pain is part of that basic human right to health.

Despite recent advances in our understanding of the physiology of acute pain, the development of new opioid, non-opioid analgesics and novel methods of drug delivery, and more widespread use of pain-reducing minimally invasive surgical techniques, pain after surgical procedures re-

mains a challenge for many practitioners. Not surprisingly, recent surveys in the United States and Europe have emphasized the insufficient quality of postoperative pain management and the need for further improvements. The increasing implementation of standardized pain evaluation and treatment protocols, and the use of multimodal analgesic techniques, are hopeful signs that improvements in pain management are likely to continue in the years ahead. It appears that analgesia has a lower priority than other aspects of healthcare in developing countries so that effective pain relief is unavailable to large numbers of patients (2-3, 11,).

## Methods

### Study area

The study was conducted at Saint Paul's Hospital Millennium Medical College (SPHMMC), which is located in the northern part of Addis Ababa. The college has more than 2800 clinical, academic and administrative and support staffs that provide medical specialty services to patients who are referred from all over the country. While the inpatient capacity is more than 700 beds, The College sees an average of 1200 emergency and outpatient clients daily. Department of surgery is one of the oldest accommodating the biggest surgical load in the country, operating more than 5000 cases a year. Since July 2015, SPHMMC has opened a new hospital called AaBET, which is dedicated for burn, emergency and trauma patients. Study design: A prospective cross sectional study design was carried out through a predesigned structured data collection format and interviewing of patients from October 1 -31, 2016. Patients were clarified on numerical rating scale during the interview. All adult surgical patients who were admitted and operated during the study period at SPHMMC department of surgery, orthopedics and neurosurgery were included.

### Exclusion criteria

Patients who are non-communicative or comatose and who did not give consent to be included in the student were not included.

A structured data collection format was used to collect data from the patients and their records, after verbal consent was taken by trained data collectors. Interviews were made on their 1st post-operative day & at discharge or 5th POD. The format was written in English language as clinical records are found with the same language to retrieve patient information. Measurement of pain was obtained using numerical rating scale(NRS). Trained research nurses who were not involved in the postoperative care asked patients about their pain at rest on the day after surgery & at discharge or 5th POD. The 11 point NRS was used, where 0 indicates no pain and 10 the worst pain imaginable which was translated to Amharic (13-15).

Data was analyzed using SPSS version 20. Descriptive analysis was used to describe the patients, the level of pain, types of medications, the types of procedures and timing. Chi square and Logistic regression model was employed to

determine the predictors of acute post-operative pain management. Bi-variable analysis was done to identify factors which have association and the factors with p value of 0.25 and below was included in the multi-variable analysis to identify the factors which affect the level of control and level of satisfaction. Tables, figures and texts display results. Associations between variables was tested by chi-square test and was considered significant when p-value is less than 0.05. Permission was obtained from SPHMMC IRB & department of surgery to conduct the research.

The following working definitions were used during the study:

**Acute post op pain:** pain present in a surgical patient after a procedure until discharge.

**Persistent post op pain:** pain that persisted more than 3months after procedure

**First Post-operative day:** post operative day after the first 24hrs passed

**Mild Pain:** NRS 1-3

**Moderate Pain:** NRS 4-6

**Severe Pain:** NRS 7-10

**POP Pain management:** giving analgesics post operatively to relief POP pain

**Analgesia Failure:** Patients who experienced moderate-severe pain and the percentage of patients who experienced severe pain at some time during the first 24h

**Major surgery:** surgery undertaken in the major OR surgery under taken in the major OR through the administration of general anesthetic drugs.

## Results

During the study period, 528 patients who are above 18yrs of age and who fulfilled our inclusion and exclusion criteria were included. Four patients were excluded from the analysis because of incomplete records making the response rate 99%. From the 524 patients studied 294 (56.1%) were males and the remaining 230 were females. The age range of the

study group was 18-93yrs with mean age 39.9 (S.D. 16.1) years; median of 37 years. It was also found that most of the study patients are from urban area which accounted for 73.5% (385 patients). Most of the study patients were also married (362 patients) and 111 (21.2%) were above secondary in their educational level. Majority of males (52.4%) reported moderate to severe pain after 24 hours of surgery when compared to females. Ninety-three percent of females were satisfied with POP pain management when compared to males during the study period. Majority of patients (59.3%) in the age group 35-39 yrs. reported moderate to severe pain after 24hrs of surgery when compared to others. Majority (90.3%) of those above 60yrs of age were satisfied with the POP pain management when compared to other age groups

## Admission by units

The 524 patients included in the survey admitted to over five different units in the college at two hospitals (St. Paul's & AaBET). Three hundred and seventy-eight admissions (72.1%) out of total were on elective basis while the remaining were emergencies. From all emergency admissions 55.8 had moderate severe pain at first POD while 47.9% of those admitted on elective basis had moderate to severe pain. The common procedures performed during the study period are Cholecystectomy 59 (11.3%) & Thyroidectomy 51 (9.7%) fol-

**Table 1.** Postoperative prescription pattern at SPHMMC during the study period

Analgesia	n	%
Diclofenac	154	29.4
Diclofenac + Tramadol	251	47.9
PCM + Tramadol	3	0.6
Pethidine	1	0.2
Pethidine + diclofenac	1	0.2
Pethidine + Tramadol	6	1.1
Tramadol	108	20.6

**Table 2.** Intensity of pain among procedures performed at the different departments of SPHMMC October 2016

Unit	Pain at 1st POD				Pain at discharge/5th POD			
	None (NRS 0)	Mild (NRS 1-3)	Moderate (NRS 4-6)	Severe (NRS 7-10)	None (NRS 0)	Mild (NRS 1-3)	Moderate (NRS 4-6)	Severe (NRS 7-10)
General surgery	24	115	94	37	0	226	26	18
Urology	5	32	29	6	0	64	3	5
Orthopedics	3	53	41	14	3	57	41	10
Neurosurgery	0	18	27	2	0	19	25	3
Burn	0	8	2	0	0	10	0	0
Miscellaneous	0	5	5	4	0	7	3	4
Total	32	231	198	59	0	383	98	37

**Table 3.** Postoperative pain score & level of pop pain management satisfaction of the study population at SPHMMC October 2016

Variable	Pain at 1st POD		Pain at discharge /5th POD		POP pain management satisfaction		P-Value	OR	95 % CI	
	Mild	Moderate to severe	Mild	Moderate to severe	Poorly satisfied	Satisfied				
Sex	Male	140	154	203	88	22	271	0.046	1.56	1.045-2.330
	Female	123	107	180	50	16	212			
Educational status	No education	58	61	70	49	16	103	0.031	3.58	1.124-11.38
	Primary	65	84	112	37	9	139			
	Secondary	73	72	114	29	9	135			
	More than secondary	67	44	87	23	4	106			
Mode of admission	Elective	197	181	297	80	27	249	0.002	2.17	1.32-3.557
	Emergency	65	80	85	58	11	133			
Length of incision	≤ 5cm	76	111	151	36	14	173	0.003	0.53	0.349-0.808
	>5cm	187	150	232	102	24	310			
Duration of surgery	<1hr	131	111	206	36	12	229	0.003	1.84	1.229-2.762
	>1hr	127	137	165	97	23	239			

lowed by open reduction and internal fixation 47(9%). The highest prevalence of moderate to severe postoperative pain demonstrated after craniotomy (81.3%) followed by external fixation (76.9 % at first & 75% at fifth POD) and debridement (66.7%).

### Comorbidity

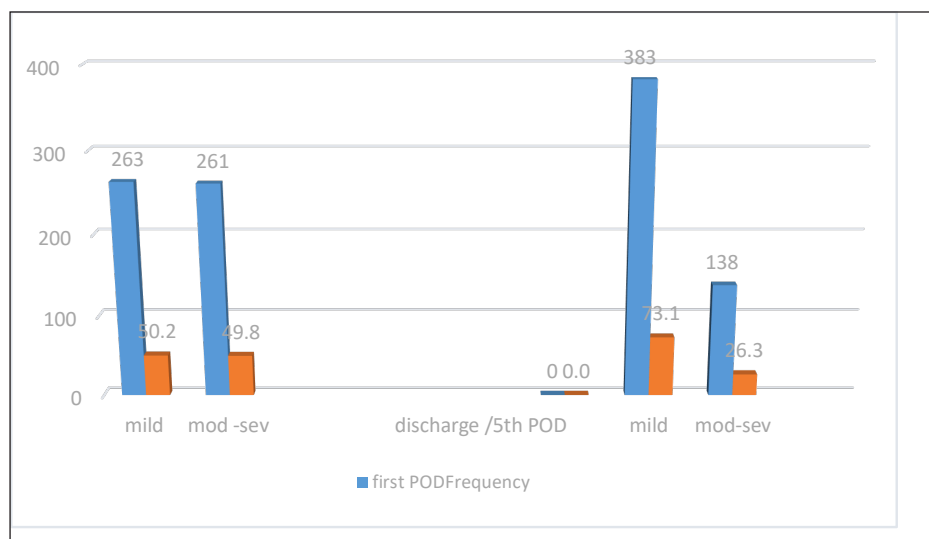
During the study period, 54 patients (10.3%) had comorbidities. The commonest comorbidity identified during the study period was hypertension, which was detected in 27 patients (5.1%) followed by Diabetes mellitus in 17 patients (3.2%) and HIV in seven patients (1.3%). Other comorbidities identified were Asthma, Hepatitis & rheumatoid Arthritis. Presence of comorbidity was found to have no association with post-operative pain or its management satisfaction.

From 524 patients included in the survey during the study period 377(71.9%) patients had pain before surgery and 105 (20%) patients had history of surgery before their current operation. Majority of patients (51.7%) who experienced preoperative pain had moderate to severe pain after 24hrs of surgery when compared to those without pain (43.9%). Similarly, 53.3 % (56 patients) of those who had history of surgery before current surgery had a higher prevalence of moderate to severe pain at first POD when compared to those without previous surgery (49.3%). Those patients taking preoperative analgesia had less post-operative pain & satisfaction with treatment (92.6 %) when compared with those who did not take.

General anesthesia(GA) was given for 379 (72.3%) patients during the study period and 128 (24.4 %) patients were

operated under spinal anesthesia(SA). The remaining 17 patients were operated under ketamine and propofol anesthesia without intubation. One patient was given ankle block & another one patient wound infiltrated with local anesthetic agent in addition to their anesthesia. More than half (54.7%) of patients operated under SA had moderate to severe. From 379 patients who took GA, 47.4% of patients had moderate to severe pain at first POD. During the study period 337(64.3%) patients operated through skin incision >5cm. No intraoperative complication was encountered during the study period. One hundred & eleven (59.3%) patients with skin incision ≤ 5cm have moderate to severe pain out of which 16.6 % of patients had severe pain after 24hrs of surgery. At discharge 36.2 % of patients with >5cm skin incision had moderate to severe pain compared to those with <5 cm. Operation on 50.4% of patients took more than one hour. Majority of patients (51.9%) with operation more than 1hour had moderate to severe pain after 24hours of surgery than the remainder (45.7%).

Post operatively all patients who were operated during the study period were prescribed different groups of analgesia & administered by nurses. Patients who received combination of IV & IM medications had less moderate to severe pain & better satisfaction (very good to excellent) than the remainder. Intramuscular(IM) administration was found to have less pain after five days or discharge (92.5 % had mild pain). Among the post-operative orders 16(3.1 %) patient's order not carried out on the cardex. Out of total 10 (1.9%) patients reported complications of post op analgesia, which are nausea & vomiting.



**Figure 1.** Pain intensity at first & fifth POD / discharge of the study population at SPHMMC October 2016

The prevalence of acute postoperative pain among patients included in the study is 93.9% (492 patients). Two hundred & sixty-one patients (49.7%) were found to have moderate to severe pain at 1st POD and 138(26.3%) patient had moderate to severe pain during discharge or at 5th POD during the study period. Sixty-three (12%) patients reported have severe pain in the first 24hrs. Patients were also asked if they are satisfied with acute postoperative pain management in the study period & 341(65.1%) said it is good while only 40 patients (7.6%) reported they are poorly satisfied. Twenty-eight patients (5.3%) said it was excellent.

Most patients (55.9%) admitted on emergency basis also had moderate to severe pain in the first 24hrs while 47.6% of those admitted on elective basis had moderate to severe pain.

Chi square & logistic regression methods employed using SPSS version 20 for analysis. Binary & multivariate logistic regression analysis was carried out in order to control potential confounding variables & to determine factors affecting level of pain control and patient satisfaction during the study period. As a result, sex, level of education, length of incision, combined IM & IV route of administration & duration of surgery were found to have significant association with level of pain & POP management satisfaction on bivariate analysis. Further multivariate analysis carried out to confirm the associations and route of administration was found to have no significant association with level of postoperative pain or satisfaction of POP pain management. Multivariate analysis additionally demonstrated emergency procedures as additional independent risk factors for post-operative pain.

Female sex has been significantly associated with mild or no pain at fifth postoperative day or discharge OR (1.6) P (0.03) 95% CI. Length of skin incision below 5cm significantly associated with moderate to severe pain in the first POD OR (1.8) P (0.001) 95% CI while length of incision above 5cm has no significant association with postoperative pain score P- Value (0.7). Duration of surgery more than 1hr

significantly associated with moderate to severe pain at first POD OR (1.5) P (0.03) 95% CI. Emergency surgery is an independent risk factor for moderate to severe pain at first POD OR (2.2) P (0.002) 95% CI.

Satisfaction with the postop pain management was significantly associated with educational status above secondary OR (3.5) P (0.03) 95% CI. Emergency admission & procedure were independent risk factor for development of moderate to severe pain at first POD OR (2.2) p (0.002) 95% CI (Table 4).

## Discussion

In a brief reference to postoperative pain in 1997 the Audit Commission (UK) proposed a standard whereby less than 20% of patients should experience severe pain following surgery after 1997, and that this should ideally reduce to less than 5% by 2002 but the overall incidence of severe pain reported in the literature is 11 % ( 2). Our result is very similar to this as we found incidence of severe pain is 12%. This contrasts with the Audit Commission's (UK) recommendation that by 2002 less than 5% of patients should experience severe postoperative pain. These findings reveal the fact that postoperative pain is still undermanaged & challenging regardless of the setup of the care provider (2, 3, 6- 8, 12-16, 27).

We interviewed patients the first time after 24hours of their surgery because it is probable that they can distinguish their pain at this time. Most of the publications found on the literature measured pain at this time. There are variations in the expert's opinion on the method of pain intensity measurement scales but WHO conducted a study & found no difference in pain intensity due to measurement scales as a result we choose Numerical rating scale (NRS) for it is the commonly used one (1,2,4, 8,27).

Postoperative pain after 24 hours of surgery is prevalent



in our setting. The prevalence of acute postoperative pain in our setting is 93.9% but the global prevalence of POP ranges from 50% to 75% of postoperative patients (1, 8, 13, 14). Two hundred & sixty-one patients (49.7%) were found to have moderate to severe pain at 1st POD and 138 patients (26.3%) had moderate to severe pain during discharge or at 5th POD during the study period. Sixty-three patients (12%) reported to have severe pain in the first 24hrs. In accordance with our result is a study conducted in Jimma that demonstrated post-operative pain prevalence of 91.4 % in patients operated at Jimma university hospital (4). Our result is also consistent with another study conducted in Nigeria. In Nigeria, a study reported that 95% of postoperative patients experienced various degrees of POP (7). A study from Gondar reported at the 24th hour, 53% of patients experienced moderate to severe pain which is in agreement with ours (1). A study in Tanzania also showed 85.5% of patients experienced various degree of POP 24 hours' post-surgery at rest. The remainder 18 (14.5%) were pain free. Among the patients, 96 (77.4%) of them experienced various degree of POP 48 hours' post-surgery at rest. In contrast to Our finding a research done in Nigeria on 200 adult patients who presented for a variety of surgical procedures found out 68% of patients experienced moderate to severe post-operative pain which could be attributed to the different setting & background of patients (29). In Netherlands a study was done to find out the prevalence of postoperative pain in 1490 surgical in patients who were receiving postoperative pain treatment according to an acute pain protocol found out that 41% of the patients on day 0 and 30% on day 1 experienced moderate to severe pain (30). The fact that patients getting treatment still reporting significant pain is another evidence that acute POP pain management is challenging in both developed & developing countries along the globe.

In the current study length of incision found to be an independent risk factor for development of moderate to severe pain. It was found that length of wound < 5cm has been significantly associated with moderate to severe pain in the first POD OR (1.8) P (0.001) 95% CI, which could be explained by the tension on the fascia.

Emergency surgery found to be an independent risk factor for moderate to severe pain at first POD when compared to elective patients. This in accordance to study from South Africa that illustrated higher incidence of pain & inadequate analgesia in emergency surgery (32). 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.

Duration of surgery more than 1hour was also found to be an independent risk factor for moderate to severe pain at both first POD OR (1.5) P (0.03) 95% CI. The core component of an effective surgery schedule is accurate surgery duration estimations. Longer duration of surgery results in longer anesthesia time, which all can explain outcome of long surgery underestimation of analgesic requirement in patients who undergo surgery with neuraxial blockade (28,31).

Most important parameter assessed with current survey with intensity of pain is level of postoperative pain management satisfaction. Although 93.9 % of the study population reported some sort of pain in the postoperative setting, 92.2% the patients were satisfied with POP pain management. This paradox was also reported by a study from Jimma, south Africa & Netherlands (2,4,2,31). The main reasons identified by most studies for higher rate of satisfaction despite the presence of pain intensity are the exceptionally good caring attitude of health care professional, presence of frequent pain assessment, high rate of preoperative pain counselling, and good communication. In the current study educational status above secondary was identified as an independent determinant of level of post op satisfaction OR (3.5) P (0.03) 95% CI, which could be, attributed to the good communications skill they academically developed over time.

Although no statistically significant association was found between ages, presence of comorbidity prior surgery, preoperative analgesia, type of anesthesia and level of POP or post op pain management satisfaction, presentation on emergency basis, SA & post op pain counseling looks to affect pain outcome. Type of post op analgesia & route are also important risk factors, which the current study did not find any significant association. Post op analgesia & its route of administration are corner stones of post op pain management & are areas of improvement as it was illustrated by reports from Gondar, Jimma, South Africa & other developed countries (1, 4, 31, 32).

## Conclusions and recommendations

Postoperative pain is prevalent in our setting & not well managed. The researcher believes pain should be assessed postoperatively & appropriate management must be provided. Additionally, as length of incision & duration of surgery are among the independent risk factors for POP pain, fine minimally invasive surgeries should be employed in an effort to decrease postoperative pain & adverse outcomes associated with it. Most of our patients developed moderate to severe postoperative pain while they are on pain management that fulfils analgesia failure criteria as a result other management options like patient controlled anesthesia (PCA) & epidural analgesia should be considered. Post-operative pain management guidelines & protocols are good options as it can bring uniformity in assessing pain & managing it.

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