E-ISSN: 2706-9575
P-ISSN: 2706-9567
IJARM 2020; 2(1): 88-94
http://www.medicinepaper.net
Received: 18-11-2020
Accepted: 26-12-2020

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Indian abdominal surgery postoperative pain control: A multi-center drug use study

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DOI: https://doi.org/10.22271/27069567.2020.v2.i1a.405

Abstract
Aims: Postoperative pain is frequent among hospitalized patients. Different therapeutic traditions and the attitudes of each hospital's medical staff impact its treatment. This study Aim to find out how analgesic drugs were prescribed and used to treat pain after abdominal surgery in Indian hospitals. It also Aim to find out how common and bad postoperative pain was, as well as how much the way pain was treated differed between the centers that took part.
Methods: The study involved a descriptive cross-sectional examination of drug use in 12 Indian hospitals. The subjects were a non-selected sample of consecutive abdominal surgery patients who were hospitalized between October 2020 and January 2022. Information about the surgical technique and the use of analgesics was prospectively obtained for each patient. On the first day after surgery, a visual analogue scale (VAS) and a six-point scale (none, mild, moderate, severe, very severe, and intolerable) were used to rate the level of pain.
Results: There were 993 patients (547 men) involved in the study. Inguinal hernia repair (315, 32%), cholecystectomy (268, 27%), appendectomy (140, 14%), bowel resection (137, 14%), and gastric surgery (58, 6%) were the most prevalent surgical procedures. 59% (587) of patients received only nonopioid analgesics, 9% (89) received only opioid analgesics, and 27% (263) received both opioid and nonopioid analgesics. Metamizole (667 patients) and pethidine were the medications provided most frequently (213 patients). Although the administration of analgesics was scheduled in the majority of physician orders, the majority of actual doses were administered "as needed." The average daily doses of all analgesics delivered were less than those indicated. 38 percent (371/967) of patients reported severe to terrible first-day maximum pain. The surgical procedures that had been conducted, the analgesics that had been administered, and the pain scores that had been reported by patients exhibited substantial interhospital variation. Between 22% and 67% of patients in each facility had pain that was severe or intolerable.
Conclusions: It appears that poor usage of analgesics is to blame for the fact that many patients in India continue to experience significant pain after undergoing abdominal surgery. It was found that there were big differences between hospitals in how pain after surgery was treated and how often it happened.

Keywords: Analgesics, drug use evaluation, drug utilization studies, hospital, postoperative pain

Introduction
Pain after surgery is an unresolved issue, and large-scale population studies on the consequences of postoperative pain will help to enhance current treatment [1]. Six national surveys published between 2010 and 2020 on acute surgical and nonsurgical pain revealed that: 1) more than half of patients in all surveys experienced moderate (from 4 to 6 on a 0–10 numeric rating scale, NRS) to severe (NRS 7) pain; and 2) despite the availability of new treatments, there was no evidence of improvement in acute pain outcomes. Several national authorities have adopted new criteria for postoperative pain care [2-3], including multidimensional pain assessments, to combat this stagnation [4]. There is currently no data to support postoperative pain outcomes among the Indian population. A multidimensional pain assessment is regarded as the most accurate method for measuring pain outcomes [5-7]. Other pain-related outcomes, such as interference with sleep and daily activities, adverse effects of analgesic medicine, and satisfaction with pain management, might be examined in addition to pain severity [8-11]. Recent research has evaluated postoperative results in numerous European nations and the United States using a comprehensive self-administered questionnaire that links pain outcomes with analgesic administration [12]. All of them regularly exhibit a high prevalence of postoperative pain with a worst pain intensity ranging

from 5.0 to 8.4 on a 10-point scale (NRS 0-10) [13]. Postoperative pain (POP) has a negative impact on the patient's short-and long-term recovery, and can lead to the development of acute medical issues and lengthened hospital stays. In addition, multiple studies indicate that after typical surgical procedures, 30 to 50% can suffer persistent pain, which can be severe in 1 to 10%. Moderate to severe acute POP has been connected with prolonged pain after surgery, among other things. It has been suggested that reducing the intensity of POP by various therapeutic approaches may avoid the development of chronic pain following surgery. However, there is currently little knowledge regarding the most effective analgesic therapy to reduce POP [14], as well as the positive and negative effects of acute and chronic opioid administration (Figure 1). This article deals with these problems by using the PAIN-OUT registry to do an observational study on a large group of Indian patients.

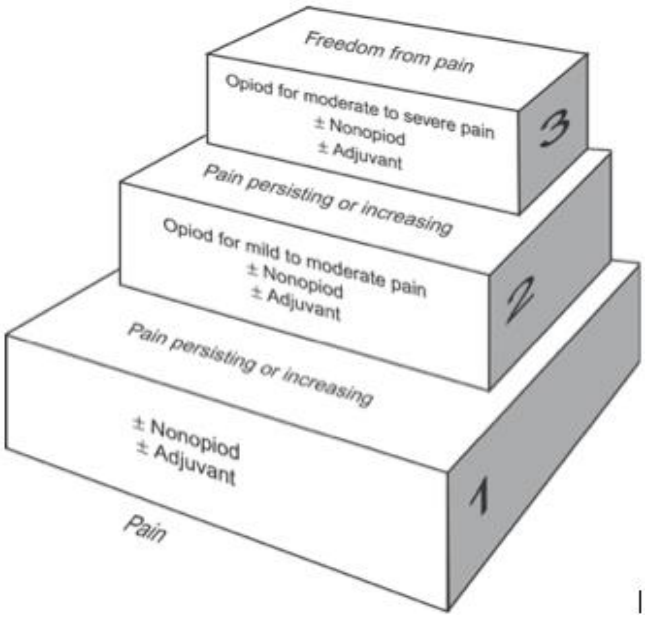

Fig 1: The WHO pain relief ladder, commonly used in the management of pain due to cancer.

Observational data from the PAIN-OUT registry permits replication of daily practise and international comparison, but causal relationships cannot be inferred [15-18]. Painout is a web-based database that aims to improve clinical decision making and postoperative outcomes by registering pain management and outcomes from hospitals in Europe (and the rest of the world). In order to gain a comprehensive understanding of postoperative care in India, we evaluated PAIN-OUT outcomes in thirteen tertiary care hospitals. 1) to evaluate and contrast postoperative outcomes and anaesthetic / analgesic management in orthopaedics (ORT) and general (GEN) surgery patients; 2) to investigate the impact of analgesic therapy on outcomes and opioid requirements; and 3) to assess and compare outcomes and analgesic management by surgical procedure.

Methods

Sample and Study Design: This is a cohort study that analyses data collected from 13 hospitals in India. From an initial sample of 993 patients, the analysis included 993 patients.

Patients who underwent GEN or ORT procedures and responded to the PAIN-OUT questionnaire on the first post-operative day completed the study. Each participant hospital's Research Ethics Committee approved the protocol. Participating hospitals were public university hospitals (300-1000 beds), dispersed throughout India (seven distinct regions), with an acute pain service. From February 2020 to December 2022, trained research assistants collected data (RA). The RAs did not make clinical decisions or administer pain treatments. All patients who agreed to participate and met the inclusion criteria were enrolled by the RA. If the number of surgeries exceeded the RA's capacity, patients were randomly assigned by computer. Within the first postoperative day, patients who voluntarily gave their verbal consent, after explanation by the RA, filled out the questionnaire (strictly anonymous), which included a letter of information and participation request on the first page. When patients were too weak or tired (due to surgery) or unable to read or write, they were verbally questioned.

Inclusion and Exclusion Criteria

Inclusion criteria:>18-year-old surgical patient who gave informed consent, was in the first postoperative day and in the ward for at least 6 hours.

Exclusion criteria: refusal to participate, sedation, unconsciousness, absence from the ward at the time of data collection, or inability to communicate due to cognitive impairment or poor command of the Indian language. Additional exclusion criteria were: 1) did not complete > 50% of the International Pain Outcome (IPO) Questionnaire; 2) did not answer the "worst pain" question; 3) the ICD-9 code (type of surgery) was not recorded in the Process Questionnaire (PQ); and 4) having undergone surgeries other than GEN or ORT, such as gynecologic, urologic, ENT, etc.

Questionnaires: The data collection questionnaires included: 1) the self-administered validated IPO, a modified version of the Revised American Pain Society-Patient Output Questionnaire (APS-POQ-R), with good psychometric properties [17]; and 2) the validated APS-POQ-R. The Indian version of the IPO was generated via a forward-backward translation in accordance with international norms, and 2) the PQ was completed by the RA using patient medical history information (Supplemental Material 1 and 2). The IPO is intended to assess the following five components of pain: 1) pain intensity and relief, including the worst pain, the least pain, the percentage of time with intense pain, and the percentage of pain control with treatment; 2) pain intervention with sleep, in-bed and out-of- bed activities, breathing, and emotional wellbeing; 3) adverse reactions of the analgesic treatment, including nausea, drowsiness, dizziness, and itching; 4) capacity to engage in pain treatment decisions, awareness of quality of care and satisfaction; and 5) utilisation non-pharmacological interventions Also included are questions regarding discomfort and pain intensity during the three months preceding surgery. Utilized were NRS (0-10) or dichotomous selection and multiple choice questions (i.e. for non-pharmacological pain treatment strategies). The percentage of patients who experienced side effects was recorded, and their intensity, as well as that of pre-surgery

chronic pain, was quantified using a 0 to 10 NRS scale. Severe pain was defined as an NRS score more than 7 and moderate pain as a score between 4 and 6. The PQ includes demographic information: gender, birth year and country, weight, height, nationality, and comorbidities; type of surgical procedure (ICD-9 codes) and anaesthesia; analgesics and sedatives administered in the preoperative, intraoperative, and postoperative periods, including the drug name, dose, and route of administration.

Analgesic medications The PQs provided analgesic medications and dosages for postoperative pain. Remifentanil and intraoperative fentanyl were not postoperative analgesics because they were administered as part of the anaesthesia regimen. The analysis included intraoperative intravenous (iv) morphine (MS) because it was provided to provide postoperative analgesia. All intravenous opioids were converted to intravenous MS and then multiplied by a ratio of 3, whereas oral opioids were converted straight to oral MS. In accordance with published equianalgesic tables, postoperative opioid needs were converted to oral morphine. Multimodal analgesia is the administration of multiple analgesics or adjuvants with distinct mechanisms of action. Regional analgesia, such as epidural medications, peripheral nerve blocks (PNB), and wound infiltration were evaluated separately.

Sample Size: If we assume that the alpha risk is 0.05 and the beta risk is 0.2 in a two-sided test, then we need at least 561 subjects in each surgery group in order to identify a between-group statistically significant difference in the amount of pain that is greater than or equal to 0.5 units. The assumed value for the standard deviation (SD) of the population is 2.5.19. It was projected that there would be a dropout rate of 30 percent.

Data analysis: The results of the qualitative variables were given in the form of absolute frequencies and percentages. According to the distribution of the quantitative data, the mean and standard deviation (SD) or the median and interquartile range (IQR) were calculated and used. In the case of ordinal variables, the percentage and absolute frequencies, as well as the median and interquartile range values, were utilised, depending on the number of categories. The Fisher's exact test and the Student's t test, along with Bonferroni's adjustment for multiple comparisons (if necessary), were utilised in order to make comparisons between categorical independent continuous variables. The analysis relied on the utilisation of leastwise elimination of missing data. The use of nonparametric methods for independent data was resorted to in the event that the assumptions regarding their applicability for ordinal variables were not met (Mann-Whitney test or Kruskal-Wallis).

The effect size is a quantifiable measurement of the strength of a phenomena and is categorised as being either small (d=0-0.2), medium (0.3-0.5), or big (>0.5). We utilised the Cohen's d coefficient with a confidence interval of 95 to quantify the effect magnitude when comparing patients in the ORT group to those in the GEN group (CI95). In addition to that, Cohen's d was utilised in order to link continuous variables obtained from the outcomes questionnaire. Our value remained the primary criterion for reporting changes throughout the entirety of the Results and Discussion sections of this work. In our report, values were considered clinically important when Cohen's d was more than 0.3. Comparisons between groups with fewer than ten patients were not carried out since there was insufficient statistical power to do so and the conclusions could be misleadingly accurate. For the purpose of data analysis, IBM SPSS Statistics 20.0 was utilised.

Results

The study comprised 993 patients (547 of them were male, or 55% of the total). Their median age was 58 (range: 14-91), and 13% of them were older than 70. 573 (57%) individuals exhibited no related ailment. The most prevalent related problems were hypertension and/or heart failure (224 patients), chronic respiratory diseases (114 patients), and dyspepsia and/or peptic ulcer (98 individuals).

Inguinal hernia repair was the most prevalent surgical operation (315 patients, 32%), followed by cholecystectomy (268 patients, 27%), appendectomy (140 patients, 14%), bowel resection (137 patients, 14%), and gastric surgery (58 patients, 6%). Other surgical operations included nonspecific laparotomy (25 patients), hepatopancreatic and splenic surgery (25 patients), and gynaecological surgery (6 patients).

During the study period, only 54 patients (5%) did not get any analgesics. This group's distribution of surgical procedures did not differ from that of the general population. 587 individuals (59%) received only a nonopioid analgesic, while 89 patients (9%) received only an opioid analgesic.

263 patients (27%) were given both medicines (metamizole and opiates in 62% of these cases). Metamizole (677 patients, 68%), pethidine (213 patients, 21%), morphine (108 patients, 119%), diclofenac (105 patients, 10.5%), ketorolac (74 patients, 7%), clonixin (63 patients, 6%), tramadol (55 patients, 5%), pentazocine (21.2%), buprenorphine (5 patients, 0.5%), paracetamol (4 patients, 0.4%), The proportions of patients in each surgical procedure category who received at least one dose of an opioid analgesic were 44% in category one, 48% in category two, and 61% in category three (x Pearson 15.1; P 0.001), and the proportions of patients receiving both opioid and nonopioid analgesics were 12%, 20%, and 32%, respectively gamma 2 * Pearson = 37 P 0.001.

In individuals with analgesic contraindications (such as chronic respiratory disease for opiates or peptic ulcer, dyspepsia, hypertension, or heart failure for NSAIDs), the patterns of use did not differ from those in other patients.

On the first day, 1773 analgesic prescriptions were written. The route of administration was intravenous in 1242 cases (70 percent), intramuscular in 364 cases (20.6%), subcutaneous in 103 cases (6%), other (oral, rectal) in 57 cases (3%), and unknown in 7 cases (0.4 percent).

Analgesics were planned at regular intervals (around the clock) in 941 medical orders (54.5%), as needed in 524 (30.3%), at specified intervals with a rescue analgesic in 57 (3.3%), and as patient-controlled analgesia in 42 (2.5%). In 209 (11.8%) medical instructions, the dosage schedule was not specified.

1025 of the 1,773 medical orders evaluated contained clear dosage and administration instructions. Only 651 (63.5%) prescriptions led to actual drug administration. This compliance rate was higher when only one dose was prescribed (248 of 273, 88%) and decreased to 64% (165/258), 59% (178/301), and 35% (68/193) when two,

three, or four or more doses were prescribed (Pearson= 1017; P0.0001). In general, actual daily amounts delivered were lower than those prescribed and suggested in the medical literature (as shown in Table 1).

Table 1: Prescribed and administered daily doses (mean±SD) of analgesics

Analgesic (RDD[b])	Mean dose (mg)	PDD[c] Mean number of doses	Mean dose (mg)	ADD[d] Mean number of doses	Compliance with ADD/PDD[e] ×100	Prescription % of doses given
Metamizole (3000–8000)	5185 (81)	3.99 (2.61)	2744 (62)	1.63 (1.13)	53	41
Pethidine (200–900)	257.6 (8)	4.27 (2.17)	81.5 (4)	1.69 (1.44)	32	39.5
Diclofenac (100–150)	179.6 (4)	3.89 (2.72)	105.7 (12)	1.55 (1.03)	59	41
Ketorolac (40–180)	81.9 (4)	2.64 (1.25)	54.1 (6)	1.98 (1.15)	66	75
Tramadol (200–600)	239.4 (16)	3.20 (2.77)	144.4 (12)	2.19 (2.48)	60	68
Clonixin (300–1000)	378.3 (18)	3.07 (1.43)	255.2 (17)	2.73 (1.27)	67	89
Pentazocine (240–360)	95.7 (7)	4.67 (2.89)	66.5 (5)	2.33 (1.15)	69	50

[a]Morphine is not included in this table, because in the majority of cases it was prescribed as patient-controlled analgesia.
[b]RDD=Recommended daily dose (mg).
[c]PDD=Prescribed daily dose (mg).
[d]ADD=Administered daily dose (mg).
[e](Mean ADD/Mean PDD)×100.

52% of patients in category I, 65% of patients in category II, and 69% of patients in category III got three or more doses of analgesics during the first 24 hours following the postoperative operation, respectively (52%, 65%, and 69%, respectively; Pearson = 23.5; P 0.001).

Table 2 presents the percentage of patients who fell into each of the six categories of worst pain experienced on the first day, as well as the severity of pain 24 hours after the surgical procedure, as measured by a VAS and a six-adjective categorical rating scale. These measurements were taken immediately after the operation. On the categorical scale, 69% of patients had experienced pain that ranged from moderate to terrible at some time during this period, and 38% of patients had experienced pain that ranged from severe to unbearable. 69% of respondents exhibited a severity of more than 30 mm on the VAS, and 47% rated more than 50 mm. There did not appear to be any connection between the analgesics that were actually administered and the level of pain that was experienced on the first day: the mean (SD) VAS score was 3. 47.6 mm (28.9) in those who were given only opiates, 49.2 nini (30.6) in those who were given nonopioid analgesics, and 18.5 (30) h in those who were given both types of drugs. 58 individuals, or 0% of the total, experienced some kind of negative reaction to one of the analgesics that were given to them. 26 patients had gotten both nonopioid and opioid medications, 23 patients had received a nonopioid analgesic, and 9 patients had received an opioid. Mild adverse effects were experienced, with the majority being digestive in nature (abdominal pain, nausea, vomiting, and constipation). Just three of the individuals ended up developing respiratory depression.

Table 2: Postoperative pain severity scored by means of an adjective categorical rating scale and by means of a visual analogue scale.

	Worst pain at any time on the first day		Pain at 24 h	
Postoperative pain severity	n	(%)	n	(%)
Categorical rating scale				
no pain	84	(9)	239	(25)
mild	209	(22)	353	(36.5)
moderate	303	(31)	305	(31.5)
severe	234	(24)	56	(5.9)
very severe	107	(11)	13	(1)
unbearable	30	(3)	1	(0.1)
Total number of patients[a]	967	(100)	967	(100)
Visual analogue scale (VAS)				
median, mm (range)	47	(0–100)	22	(0–100)
percentage with >30 mm at VAS	69		38.5	
percentage with >50 mm at VAS	47		14	
Total number of patients[b]	914		914	

[a]It was not possible to assess postoperative pain severity with the categorical scale in 26 patients.
[b]Severity of pain could not be assessed with the VAS in 79 patients.

Wide interhospital variability in the populations under study (as shown in Table 3) and in the most commonly used analgesic drugs (as shown Table 4) was recorded.

Table 3: Interhospital variability in patients' characteristics

Hospital (number of patients contributed)	Anaesthesiology recovery ward	Age in years (SD)	Sex (% men)	Type III surgery[a] (%)	Type II surgery[b] (%)	Emergency surgery (%)
1 (n=105)	Yes	57 (20)	58	22	33	50
2 (n=67)	No	60 (14)	58	24	34	25
3 (n=55)	No	49 (21)	56	16	25	38
4 (n=54)	No	56 (15)	70	2	28	0
5 (n=100)	Yes	60 (16)	56	44	21	18
6 (n=100)	Yes	48 (22)	41	21	42	46
7 (n=108)	Yes	53 (19)	57	18	34	38
8 (n=99)	Yes	55 (22)	54	34	20	39
9 (n=99)	No	53 (15)	48	24	29	19
10 (n=48)	Yes	48 (19)	54	25	17	42
11 (n=100)	Yes	54 (16)	65	20	23	5
12 (n=64)	Yes	63 (16) P<0.001	45 P=0.023	28	44 P<0.0001	12 P<0.0001

[a]Bowel resection, gastric surgery, gynaecological surgery, and hepatopancreatic or splenic surgery.
[b]Cholecystectomy or laparotomy.

Table 4: Use of analgesic drugs, by hospital

Hospital (number of patients contributed)	None	Opioid only	% of patients Non-opioid only	Opioid total	Opioid+ non-opioid [a]
1 (n=105)	9	14	62	29	15
2 (n=67)	9	6	36	55	49
3 (n=55)	4	0	85	11	11
4 (n=54)	6	0	85	9	9
5 (n=100)	4	23	16	80	57
6 (n=100)	5	1	90	5	4
7 (n=108)	1	21	58	41	20
8 (n=99)	2	4	62	36	32
9 (n=99)	13	2	62	25	23
10 (n=48)	12.5	0	73	14.5	14.5
11 (n=100)	0	15	50	50	35
12 (n=64)	6	3	82	12	9

[a]Received both opioid and nonopioid analgesics.

The percentage of patients who were given only opioids ranged anywhere from 0 to 23%, while the percentage of patients who were given only nonopioid analgesics ranged anywhere from 16-90%, and the percentage of patients who were given both types of drugs ranged anywhere from 4-57%. In many hospitals, including numbers 2 and 5, patients were frequently given analgesic combinations that included both opioid and nonopioid medications. In the majority of hospitals, metamizole was the nonopioid analgesic that was given to the most patients overall (68% of patients). However, in certain centres, other analgesics (diclofenac, ketorolac, and clonixin) were used most frequently. Overall, metamizole was given to 68% of patients. Pethidine was the opioid analgesic that was given out more frequently than any other drug in the majority of hospitals, and it was prescribed to 21% of the total population under study. Other opioids, including morphine (11% of patients receiving it), tramadol (5%), and pentazocine (2% of patients receiving it), were also administered. Both the percentage of patients receiving at least three doses of analgesics (which ranged from 31 to 88%; x 2 Pearson 81.96; P 0.0001) and the mean number of doses of analgesics administered during the first day of the postoperative period (which ranged from 1.96) exhibited a great deal of variability from one hospital to the next. This was demonstrated by the fact that the number of patients receiving at least three doses of analgesics

The level of postoperative pain is broken down into the various hospitals in Table 5. In addition, there was a large amount of variation seen between hospitals in terms of pain scores during the first day after the operation. As an illustration, the percentage of patients who reported having severe, very severe, or intolerable pain ranged anywhere from 22 percent in hospital 3 to 67 percent in hospital 4. The percentage of patients who reported experiencing at least moderate pain ranged from 51% in hospital 3 to 95% in hospital 4, with no consistent pattern.

In addition, the VAS scores ranged from 37 mm in hospital 10 to 67 mm in hospital 4, with no consistent pattern. There was no correlation found between the maximum worst pain severities experienced during the first 24 hours (Table 5), and the prevalence of use, in each hospital, of opioid analgesics alone (Spearman rank correlation test, r=-0.12; P=0.7), of both opioid and nonopioid analgesics (r=0.23; P=0.5), nor of use of opioid analgesics (r=-0.04; P=0.9). This was determined by using the

Table 5: Severity of postoperative pain, by hospital

	Categorical rating scale		VAS[a]		
Hospital	**% with at least severe pain (%)**	**% with at least moderate pain (%)**	**mm median (range)**	**>30 mm[b] (%)**	**>50 mm[c] (%)**
1	43	69	51 (1–100)	75	52
2	33	60	37 (0–100)	54	34
3	22	51	39 (0–87)	67	39
4	67	91	67 (5–100)	87	67
5	40	83	57 (1–100)	83	63
6	41	74	48 (0–99)	77	47
7	27	63	42 (0–98)	64	41
8	47	79	53 (0–100)	79	59
9	29	66	41 (0–100)	61	41
10	29	51	37 (0–99)	54	29
11	43	69	41 (0–100)	63	42
12	38	72	38 (0–100)	59	43

[a]Visual analogue scale.
[b]Percentage of patients who scored 30 mm or more on VAS.
[c]Percentage of patients who scored 50 mm or more on VAS.

Discussion

The current study shows that even though effective painkillers are available, a large number of people who have had abdominal surgery are in a lot of pain right after the surgery [19-20]. Parenteral nonopioid painkillers were the most common drugs, and they were usually given through an IV. Analgesics were not used well in a large number of patients because, even if they were prescribed on a regular schedule, they were often given to treat pain that was already there instead of preventing it, and their doses were often not enough. There were big differences between hospitals in both the quality and amount of analgesic use, but these differences didn't seem to have anything to do with how bad pain was on average in each hospital.

Conclusion

Our study confirms smaller studies done in India, which showed that, unlike in other places, nonopioid analgesics, such as nonsteroidal anti-inflammatory drugs, are the best way to treat pain after surgery. The fact that nonopioid analgesics are used more often than opioids doesn't seem to have anything to do with worries about the bad effects of opioids, since the risks of using all classes of analgesics didn't seem to be taken into account.

38% of patients said that their worst pain on the first day was severe, very severe, or intolerable, and 44% said that it was more than 50 mm on the VAS. This high rate of severe pain should be seen as a failure of therapy, since it can be stopped. Special ways to treat pain (like patient-controlled analgesia, which was used in 2% of cases) were rarely used or not used at all (e.g. epidural analgesia).

There was a lot of difference in how analgesics were used between hospitals. At least 9% of people in four hospitals did not get any painkillers. This could be because the people in the study group were not chosen at random. There were also differences in how often people had severe pain, but there was no link between that and the rate of using opioid analgesics, the rate of using nonopioid analgesics, or the use of any analgesic at full doses and on a regular schedule. But in a cross-sectional study like this one, the lack of a correlation can't be taken as proof that the treatment doesn't work. This is because differences between hospitals in the populations being studied (in terms of demographics, surgical procedures, or other things) can make it hard to tell if there is a causal link.

Unfortunately, these results agree with those of other studies that show it is common to treat pain after surgery in the wrong way. Some people think that this is because doctors and nurses don't always agree on how bad the pain is, that patients and doctors don't always agree on how bad the pain is, and that doctors prescribe and nurses give doses that are lower than what is recommended. Our findings back up these ideas. To get better at dealing with such a common problem, medical and nursing staff must keep learning. Using simple tools like pain scales, the nursing staff is also very important in figuring out how bad pain is on a regular basis. Use of pain charts as part of routine clinical evaluations of patients, along with records of fever, heart rate, and blood pressure, may also help control pain. You can also use these charts to check the quality of care.

Most often, continuing education of health care professionals has been suggested as a way to make it easier to deal with pain after surgery. But education by itself is not enough. In one study, the patients' outcomes did not change after they were educated. It has been said that the pain relief after surgery got better after a hospital started using simple techniques and easy-to-understand instructions with a multidisciplinary team. It has also been suggested that the quality of patient care be checked regularly. Finding out how common and bad pain is after surgery is a part of evaluating health care in a hospital setting. This study will be used as a guide for future evaluations of intervention measures that aim to improve the treatment of pain after surgery.

References

1. White PF, Kehlet H. Improving postoperative pain management: what are the unresolved issues?. The Journal of the American Society of Anesthesiologists. 2010;112(1):220-225.
2. Meissner W, Coluzzi F, Fletcher D, Huygen F, Morlion B, Neugebauer E *et al*. Improving the management of post-operative acute pain: priorities for change. Current medical research and opinion. 2015;31(11):2131-2143.
3. Rosenquist RW, Rosenberg J. Postoperative pain guidelines. Regional Anesthesia & Pain Medicine. 2003;28(4):279-288.
4. Ho K, Spence J, Murphy MF. Review of pain-measurement tools. Annals of emergency medicine. 1996;27(4):427-432.

5. Von Korff M, Jensen MP, Karoly P. Assessing global pain severity by self-report in clinical and health services research. Spine. 2000;25(24):3140-3151.
6. Younger J, McCue R, Mackey S. Pain outcomes: a brief review of instruments and techniques. Current pain and headache reports. 2009;13(1):39-43.
7. Kahl C, Cleland JA. Visual analogue scale, numeric pain rating scale and the McGill Pain Questionnaire: an overview of psychometric properties. Physical therapy reviews. 2005;10(2):123-128.
8. Gordon DB, Polomano RC, Pellino TA, Turk DC, McCracken LM, Sherwood G *et al*. Revised American Pain Society Patient Outcome Questionnaire (APS-POQ-R) for quality improvement of pain management in hospitalized adults: preliminary psychometric evaluation. The Journal of Pain. 2010;11(11):1172-1186.
9. McNeill JA, Sherwood GD, Starck PL, Thompson CJ. Assessing clinical outcomes: patient satisfaction with pain management. Journal of pain and symptom management. 1998;16(1):29-40.
10. Dworkin RH, Turk DC, Farrar JT, Haythornthwaite JA, Jensen MP *et al*. Core outcome measures for chronic pain clinical trials: IMMPACT recommendations. Pain. 2005;113(1):9-19.
11. Gan TJ. Poorly controlled postoperative pain: prevalence, consequences, and prevention. Journal of pain research. 2017;10:2287.
12. Polanco-García M, García-Lopez J, Fàbregas N, Meissner W, Puig MM *et al*. Postoperative pain management in Spanish hospitals: A cohort study using the PAIN-OUT registry. The Journal of Pain. 2017;18(10):1237-1252.
13. Patel KV, Allen R, Burke L, Farrar JT, Gewandter JS, Gilron I *et al*. Evaluation of composite responder outcomes of pain intensity and physical function in neuropathic pain clinical trials: an ACTTION individual patient data analysis. Pain. 2018;159(11):2245.
14. Chang SH, Chang TC, Chen MY, Chen WC, Chou HH. Comparison of the efficacy and safety of dinalbuphine sebacate, patient-controlled analgesia, and conventional analgesia after laparotomy for gynecologic cancers: a retrospective study. Journal of Pain Research. 2021;14:1763.
15. Schwenkglenks M, Gerbershagen HJ, Taylor RS, Pogatzki-Zahn E, Komann M, Rothaug J *et al*. Correlates of satisfaction with pain treatment in the acute postoperative period: results from the international PAIN OUT registry. PAIN®. 2014;155(7):1401-1411.
16. Zaslansky R, Rothaug J, Chapman CR, Bäckström R, Brill S, Fletcher D *et al*. PAIN OUT: the making of an international acute pain registry. European Journal of Pain. 2015;19(4):490-502.
17. Polanco-García M, García-Lopez J, Fàbregas N, Meissner W, Puig MM. PAIN-OUT-Spain Consortium. Postoperative pain management in Spanish hospitals: A cohort study using the PAIN-OUT registry. The Journal of Pain. 2017;18(10):1237-1252.
18. Zaslansky R, Rothaug J, Chapman RC, Backström R, Brill S, Engel C *et al*. PAIN OUT: an international acute pain registry supporting clinicians in decision making and in quality improvement activities. Journal of evaluation in clinical practice. 2014;20(6):1090-1098.
19. Thiels CA, Anderson SS, Ubl DS, Hanson KT, Bergquist WJ, Gray RJ *et al*. Wide variation and overprescription of opioids after elective surgery. Annals of surgery. 2017;266(4):564-573.
20. Hill MV, Stucke RS, Billmeier SE, Kelly JL, Barth Jr, RJ. Guideline for discharge opioid prescriptions after inpatient general surgical procedures. Journal of the American College of Surgeons. 2018;226(6):996-1003.