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Research

Postoperative Pain Management Outcomes at a Chinese Hospital: A Cross-Sectional Survey

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A B S T R A C T

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Purpose: Postoperative pain is one of the most common postoperative complications, and improper management not only adds to patient suffering but also affects patients' recovery. In this study, we measured patients' postoperative pain to understand the status of patients after surgery and to identify factors influencing postoperative pain.

Design: A descriptive and cross-sectional study

Methods: This survey was conducted at a large tertiary hospital in Chengdu, Sichuan Province. A total of 655 postoperative inpatients were included. The survey was conducted using the Chinese version of the Houston Pain Outcome Instrument. General patient data, pain management-related factors, and the pain management index were used to survey risk factors. We used t-tests and ANOVA for univariate analysis of each pain outcome category to explore the association with the predictor variables. Then, those variables with a significance level of 0.05 on univariate analysis were entered into multivariable regression analysis to identify parsimonious subsets of independent risk factors.

Findings: In this survey, 58.7% of patients experienced moderate to severe pain in the 24-hour postoperative period, and 33.6% of patients had moderate to severe average pain over the 24-hour postoperative period. The postoperative pain impact scores on patient mood, somatic function, patient satisfaction with postoperative pain management, and pain education were 3.5 ± 2.1 , 4.3 ± 3.1 , 8.9 ± 1.4 and 8.2 ± 1.8 , respectively. The pain management index, surgery type, insurance, and pain assessment of nurse were influential factors of postoperative pain intensity. Age, ethnicity, insurance, surgery type, patients' knowledge of pain, and pain assessment of the nurse affected the patients' postoperative physiological function ($F = 3.822$, $R^2 = 0.065$, $P = .000$). In addition, area of residence and physician attitudes affected the outcomes of patient satisfaction with pain management ($F = 26.652$, $R^2 = 0.259$, $P = .000$).

Conclusions: The incidence of moderate to severe pain in post-surgical patients remains high, and postoperative pain affects patients physically and psychologically. Special attention should be given to patients with lower income and literacy levels.

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Postoperative pain is one of the most common postoperative complications and a stumbling block to patients' postoperative recovery.

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A large proportion of acute pain occurs during the 24 to 72 hours after surgery. Improper management of postoperative pain increases the risk of adverse outcomes, including morbidity and mortality, as well as the cost of care.¹

In recent years, with the increasing awareness of pain, there has been growing concern worldwide about acute postoperative pain. Some countries have developed relevant pain management guidelines to ensure the safety and effectiveness of perioperative pain management and to reduce the incidence of adverse events.²⁻⁴ However, the results of postoperative pain management strategies around the world are still not promising, with approximately 52% to 89.5% of

patients experiencing pain (numeric rating scale score > 3) during the first postoperative day in Europe.⁵ A survey conducted in the United States showed that more than 80% of patients suffer postoperative pain, with less than 50% of them receiving adequate pain management.⁶ At the beginning of the 21st century, China introduced the concept of working toward a “pain-free hospital,” which was actively in line with international standards or guidelines. A previous Chinese study showed that up to 58.27% of patients experienced moderate to severe pain after surgery; among them, 80% reported inadequate analgesia, and more than 50% reported varying degrees of pain, even 72 hours postoperatively.⁷ However, this study was published in 2008, and a thorough investigation of the current status of patient outcomes in postoperative pain management was urgently needed.

Therefore, we aimed to adopt the Houston Pain Outcome Instrument (HPOI), a scale that measures patients' experience of pain, the physical and psychological impact of pain, the degree of satisfaction with pain relief, and level of education on pain control, to investigate the pain management outcomes of postoperative patients in a “pain-free ward” and the risk factors associated with pain outcomes in postoperative patients, such as general patient characteristics, staff attention and service, and pain management.

Methods

Study Design and Population

Inpatients from 17 departments, including thoracic surgery, gastrointestinal surgery, biliary surgery, liver surgery, trauma surgery, orthopaedic surgery, neurosurgery, and urological surgery, at a large tertiary care hospital in Chengdu, Sichuan Province were surveyed. Inpatients who were at least 18 years old, underwent surgery, had postoperative pain (NRS > 0 during postoperative hospital stay), and were willing to participate in the study were included. Patients were excluded if they were in a severe postoperative condition, unconscious, or unable to respond to the interview. To ensure a sufficient sample size and allow for loss to follow-up, we specified that 20 surgical inpatients would be surveyed in each of the wards with less than 50 beds and that 35 surgical patients would be surveyed in each of the wards with more than 50 beds. Permission was obtained from the local biomedical ethics review committee (2020 Annual Review 68).

Instrument

HPOI

The HPOI is a modified version of the American Pain Society's Outcome Questionnaire, a rubric specifically designed to assess pain in postsurgical patients and patient satisfaction with pain control, with 6 subscales and 33 entries. The scale is measured on a numerical scale of 0 to 10, with higher scores indicating greater satisfaction with the impact of pain on physical or daily life, satisfaction with pain control education, and satisfaction with methods of pain control or relief. The Chinese version of the HPOI was translated by Shen et al.^{7,8} It has good reliability and validity and is applicable to the evaluation of pain and satisfaction with pain control among Chinese patients.

PMI

The PMI is calculated by first categorizing patients' worst pain intensity from 0 (no pain) to 1 (1–3: mild pain), 2 (4–6: moderate pain), or 3 (7–10: severe pain). The final score is then subtracted from the strength of the analgesic prescribed, as follows: 0 (no analgesic drug), 1 (nonopioid), 2 (weak opioid), or 3 (strong opioid). The final score ranges from –3 to +3, and negative scores indicate inadequate treatment or inadequate orders for analgesic drugs. The PMI has shown good reliability and validity in Chinese patients.⁹

Data Collection

This survey was conducted among eligible patients, and the survey staff were nurses on an acute pain service team from each ward with professional pain management knowledge and skills who still received unified training, including precautions and methods for completing the survey before participating in the study. Only the staff who passed the assessment for the skills to conduct this survey were allowed to participate. The survey was completed 24 to 48 hours after the operation by the patients if they were able to write; otherwise, staff members asked patients for their answers.

Statistical Analysis

The survey was carried out in 20 wards. The postsurvey questionnaires were collected in a uniform manner, and the information within the questionnaires was collected and summarized. Continuous and categorical variables were expressed as the mean with SD and frequencies with percentages, respectively. The primary outcomes were pain outcomes surveyed by the HPOI, which fell into five categories: pain intensity, pain interference with mood, pain interference with physical function, patient satisfaction with pain management and pain relief, and patient satisfaction with pain management and education about pain management. The results for each item and the five categories were described as the mean with SD and frequencies with percentages. The predictor variables were patient characteristics, knowledge of pain, PMI, education from medical staff, pain assessment, and attitude of medical staff. T tests and ANOVA were used for the univariate analysis of each category of pain outcome to explore the association with the predictor variables. Then, those variables with a significance level of 0.05 on univariate analysis were entered into multivariable regression analysis to identify predictors. All analyses were performed using SPSS v 22.

Results

Demographic and Clinical Information

Initially, we planned to survey a total of 655 surgical inpatients in 20 surgical wards; 634 questionnaires were returned, for a return rate of 96.79%. After the exclusion of those with incomplete information, 618 valid questionnaires remained. In total, the mean patient age was 47.61 ± 17.90 years. The hospitalization time among these patients was between 1 and 75 days, with a mean time of 10 days. The physician and nurse attitudes toward pain scores were 9.3 ± 1.1 and 9.5 ± 1.0 , respectively. Most of the patients (69.90%) had partial knowledge of pain. A total of 77.51% of respondents thought nurses actively assessed their pain. Most patients (66.34%) reported a positive PMI, and 36.1% had PMI scores of 1, and 22.9% had PMI scores of 2. A third of the patients (33.66%) reported a negative PMI, and 8.7% reported PMI scores of –3 and 14.7% reported PMI scores of –2. (Table 1)

Pain Outcomes of Surgical Patients

Pain Intensity

A total of 22.8% had severe pain while completing the questionnaire. In addition, 58.7% of patients experienced moderate and severe pain within 24 hours postoperatively. Similarly, the mean pain score at 24 hours postoperatively was 3.1 ± 2.0 (Table 2).

Pain Interference With Mood and Physical Function

The mean score for the psychological impact of pain was 3.5 ± 2.1 , with high scores for pain making one dependent on others (4.3 ± 2.4) and pain making one feel annoyed (3.9 ± 2.3), particularly the former,

Table 1
General Information of the Surgical Patients (N = 618)

	Number of Cases	Proportion (percentage)
Gender		
Male	315	50.97
Female	303	49.03
Ethnicity		
Han nationality	593	95.95
Minority	25	4.05
Religious beliefs		
Have	19	3.07
None	599	96.93
Educational level		
Primary school and below	148	23.95
Junior high school	169	27.35
High school / technical secondary school	105	16.99
Undergraduate/College	174	28.16
Master degree and above	22	3.6
Marital status		
Unmarried	111	17.96
Married	477	77.18
Divorced	18	2.91
Widowed	12	1.95
Family monthly income per capita (yuan)		
<1,000	50	8.09
1,000–2,999	156	25.24
3,000–4,999	216	34.95
5,000 and above	196	31.72
Living area		
Urban area	436	70.55
Rural area	182	29.45
Insurance		
No (Own expense)	42	6.80
Some (Own expense+ medical insurance)	457	73.95
Yes (medical insurance)	119	19.26
Surgery type		
Orthopaedic surgery	166	26.9
General (GEN) surgery	175	28.3
Neurosurgery	60	9.7
Urology surgery	32	5.2
Otolaryngology surgery	34	5.5
Thyroid surgery	37	6.0
Breast surgery	30	4.9
Cardiothoracic surgery	59	9.5
Other surgery	25	4.0
Did patient know about pain		
Know	129	20.87
Partially know	432	69.90
Don't know	57	9.22
Did patient get pain education from doctor or nurse		
Yes	552	89.32
No	66	10.68
Did the nurse actively assess patient's pain		
Yes	479	77.51
No	139	22.49
PMI		
Positive	410	66.34
Negative	208	33.66

which severely affected 32% of patients. The impact on feeling out of control was relatively mild, with only 15.2% of patients feeling severely affected. Of note, pain had a relatively minor impact on the patients' inability to care for themselves, and only 24.6% of the patients reported that their self-caring ability was seriously affected (Table 2).

Patient Satisfaction With Pain Management and Education About Pain Management

A high level of patient satisfaction with postoperative pain management was observed (8.9 ± 1.4), and patients were most satisfied with the care of nurses and the response of providers to pain, with 91.0% and 91.5% of patients being particularly satisfied with these

two aspects, respectively. The score for satisfaction with postoperative pain education was 8.2 ± 1.8 , with patients being most satisfied with education on the importance of informing the nurse of changes in the pain level or location or the persistence of pain without relief (8.5 ± 2.4) and less satisfied with education on the possible side effects of pain medication (7.5 ± 2.5) (Table 2).

Risk Factors for Pain Outcomes

The analysis showed no significant differences in postoperative pain outcomes between patients of different genders, ethnicities, beliefs, or places of residence. After univariate analysis by t-tests and ANOVA, the screened influencing factors were subjected to multifactorial analysis, and the results reported in Table 3. The PMI, insurance, surgery type, and nurse-initiated assessments were influential factors of postoperative pain intensity, including the pain intensity at the time (current), the worst pain in the past 24 hours, and the average pain over the past 24 hours. In addition to age affecting the current pain intensity ($F = 5.590$, $R^2 = 0.077$, $P = .000$), patient literacy and monthly household income affected the worst 24-hours pain ($F = 8.298$, $R^2 = 0.121$, $P = .000$), and monthly household income affected the mean 24-hours pain ($F = 5.324$, $R^2 = 0.081$, $P = .000$). Age, ethnicity, surgery type, lack of insurance, lack of knowledge of pain, and proactive assessment by a nurse affected the patients' postoperative physiological function ($F = 3.822$, $R^2 = 0.065$, $P = .000$). Understanding pain and nurse attitudes affected patient satisfaction with pain education and pain management. In addition, area of residence and physician attitudes affected patient satisfaction with pain management ($F = 26.652$, $R^2 = 0.259$, $P = .000$), and receiving education on pain perception affected patient satisfaction with pain education ($F = 25.118$, $R^2 = 0.224$, $P = .000$) (Table 3).

Discussion

Pain was recognized as the fifth most important vital sign in 1995. With the introduction of the concept of pain-free hospitals and the spread of accelerated rehabilitation programs, health care providers have also reformed the management of postoperative pain.¹⁰ In this study, the current status of postoperative pain management was comprehensively investigated, and the HPOI was adopted to conduct a survey of the pain intensity in postoperative patients, the psychological and physical impact of pain on the patients and the patients' degree of satisfaction with pain management and pain education.

Our study demonstrated that 58.7% of patients experienced moderate to severe pain within 24 hours postoperatively, which is less than that reported by a previous study conducted in China in 2008 revealing that 80.9% of patients experienced moderate to severe pain within 24 hours postoperatively.⁷ This figure was 86.9% in a larger survey performed at our hospital in 2012.¹¹ The large difference in this figure between our study and others may stem from the spotlight focused on pain management in recent years, which may be related to changes in the concept and method of pain management in recent years.³ Although pain management appears to have improved in China over the last decade, the proportion of patients experiencing moderate to severe pain postoperatively remains high, and there is still a need to continue to improve pain management. The mean worst pain score experienced by Chinese patients in our study was lower than that experienced by foreign patients (France [6.4],¹² Denmark [6.5],¹³ USA [range, 6.17–8.37],¹⁴ Germany [4.8],¹⁵ and Spain [5.6]).¹⁶ It related with lower pain sensitivity and differences in surgical populations, practice patterns, or cultural/religious characteristics.

Pain affects the mind and body and can have an emotional impact on patients, especially when they feel irritable and helpless and when postoperative pain requires patients to rely on others,

Table 2
Pain Outcomes of Surgical Patients (N = 618)

	0-3	4-6	7-10	Mean	SD
Pain intensity					
Now	433 (70.1%)	141 (22.8%)	44 (7.1%)	2.9	2.0
Worst in past 24 h	255 (41.3%)	228 (36.9%)	135 (21.8%)	4.4	2.4
Average in past 24 h	410 (66.3%)	162 (26.2%)	46 (7.4%)	3.1	2.0
Pain interference with	353 (57.2%)	143 (23.1%)	122 (19.7%)	3.5	2.1
Mood: Pain makes me feel . . .					
Frustrated	361 (58.4%)	103 (16.6%)	154 (25%)	3.5	2.1
Afraid	360 (58.3%)	106 (17.2%)	152 (24.5%)	3.4	2.0
Helpless	329 (53.3%)	119 (19.3%)	169 (27.4%)	3.8	2.4
Not in control	410 (66.3%)	114 (18.5%)	94 (15.2%)	2.6	1.6
Afraid of what pain means	377 (61%)	119 (19.3%)	122 (19.7%)	3.3	2.2
Annoyed	331 (53.6%)	127 (20.6%)	159 (25.8%)	3.9	2.3
Dependent on others	294 (47.5%)	127 (20.5%)	197 (32%)	4.3	2.4
Don't want to do anything	358 (57.9%)	115 (18.6%)	145 (23.5%)	3.5	2.4
Interference with physical function	270 (43.7%)	174 (28.2%)	174 (28.2%)	4.3	3.1
Eating	303 (49.0%)	112 (18.2%)	202 (32.8%)	4.4	2.6
Caring for self	339 (54.8%)	127 (20.6%)	152 (24.6%)	3.7	2.4
Moving	266 (43.1%)	153 (24.8%)	198 (32.1%)	4.6	2.5
Sleeping	282 (45.6%)	125 (20.3%)	211 (34.1%)	4.5	2.6
Patient satisfaction with pain management and pain relief	6 (1.0%)	25 (4.0%)	587 (95.0%)	8.9	1.4
Pain relief	22 (3.6%)	74 (12.0%)	522 (84.4%)	8.5	1.7
Care by nurse	12 (1.9%)	44 (7.1%)	562 (91%)	8.9	1.5
Attention to pain	10 (1.6%)	48 (7.8%)	560 (90.6%)	8.8	1.6
Care by MD	7 (1.1%)	88 (14.2%)	523 (84.7%)	8.9	1.6
Providers' response to pain	9 (1.5%)	43 (7.0%)	565 (91.5%)	9.1	1.5
Family/friends	13 (2.1%)	44 (7.2%)	560 (90.7%)	8.8	1.7
Overall care	12 (2.0%)	72 (11.7%)	533 (86.3%)	9.1	1.4
Patient satisfaction with education about pain management	19 (3.1%)	82 (13.2%)	517 (83.7%)	8.2	1.8
Nonpharmacologic remedies	28 (4.6%)	88 (14.2%)	502 (81.2%)	8.3	2.1
Side effects	34 (5.5%)	116 (18.7%)	468 (75.8%)	8.1	2.2
Pain medicines	40 (6.5%)	135 (21.9%)	442 (71.6%)	7.5	2.5
Report when pain unrelieved	20 (3.2%)	85 (13.8%)	513 (83.0%)	8.5	2.0
Overall education	25 (4.0%)	108 (17.5%)	485 (78.5%)	8.2	2.1

including health care professionals. The survey showed that a longer wait for analgesic treatment after surgery was also a factor related to the patient's pain outcomes; longer waiting periods would not only cause physical irritation but also affect the patient's psychological well-being. In addition, the findings showed that postoperative pain had a greater impact on patients' physical condition, with 56.4% of patients reporting that pain had a moderate to severe impact on their activities, especially in terms of moving, eating, and sleeping. These effects may lead to pulmonary atelectasis-associated infection and even prolong the rehabilitation time.¹⁷ Studies have shown a strong connection between the continued experience of severe pain after surgery and worsened quality of life.¹⁸

The majority of patients in the survey (>90%) were relatively or very satisfied with the perioperative pain management and pain education they received. It is encouraging to find increased satisfaction with pain education compared to that reported in previous studies. Liu's survey showed that only 52.4% (40/200) of patients received pain management education, whereas in the current study, 89.32% of patients received pain education.¹⁹ In recent years, as the concept of adequately informing patients about analgesia and eliminating misconceptions as a prerequisite for achieving effective analgesia to improve postoperative pain management has gradually gained ground, improving nurses' pain-related knowledge²⁰ and enhancing pain education for patients has led to further improvements in pain satisfaction.²¹

In our study, it was found that patients with a low income and no insurance experienced somewhat more severe pain after surgery. Gender had no effect on the intensity of postoperative pain in patients. Types of surgery had an effect on pain intensity/pain interference with physical function and pain interference with mood. Eshete et al²² showed that types of surgery had different effects on physical function; it seemed that orthopaedic patients resumed

movement somewhat later than nonorthopaedic patients, but surgical type did not affect pain intensity; perhaps they only collected data on three types of surgery. The PMI is also an important factor in the intensity of postoperative pain in patients. Inadequate knowledge of analgesic drugs and fear of complications still exist among health care professionals.²³ Although systematic analgesic protocols have been implemented in some departments, intramuscular injections and other methods for pain relief were still applied during this investigation. In addition, the use of multiple analgesic measures is beneficial in relieving patients' pain and reducing the use of analgesic drugs. Similar to previous studies, in this study, nonpharmacological analgesic measures were considered a useful method but less frequently implemented; thus, nursing staff training in this area should be strengthened, along with related applications.^{19,24}

The positive assessment of patient pain by nurses and the attention given to patients by medical staff has an impact on postoperative patient satisfaction with pain management. Some studies have indicated that patient satisfaction with pain control is judged by the service attitude of health care professionals rather than their approach to treating pain.²⁵ The American Pain Society Quality Committee has also suggested that patient satisfaction with the attitude of health care professionals may be an important reason for patient satisfaction with pain control.²⁶ Studies of postoperative pain have found that "if doctors and nurses pay attention to patients' pain, patients have high levels of postoperative satisfaction with the services provided."²⁷ The attention of doctors and nurses has been shown to ease patients' anxiety and produce a good psychological response, which places the patient in the best psychological state needed to receive treatment, to cooperate more positively with the treatment, and thus to be more satisfied with the treatment by the health care staff.²⁸

Table 3
Multiple Regression Analysis of Variables Contributing to Pain Outcomes

Predictor	Pain Intensity Now* β (95% CI) P-Value	Pain Intensity Worst in Past 24 h [†]	Pain Intensity Average in Past 24 h [‡]	Pain Interference With Physical Function [§]	Pain Interference With Mood [¶]	Patient Satisfaction With Pain Management	Patient Satisfaction With Critical Education**
Age	0.005 (0.006–0.023) 0.001 ^{††}	\	\	0.094 (.002–.030) 0.025 ^{††}	0.003 (0.011–.016) 0.692	\	\
Ethnicity(minority)	\	\	\	0.096 (-2.656 to .190) 0.033 ^{††}	\	\	\
Educational level	\	0.167 (0.062 to 0.401) 0.000 ^{††}	\	\	\	\	\
Family monthly income per capita (yuan)	\	-0.155 (-0.628 to -0.193) 0.000 ^{††}	-0.204 (-0.373 to -0.035) 0.018 ^{††}	\	\	\	\
Insurance	0.118 (0.152–0.843) 0.003 ^{††}	0.119 (0.153–0.684) 0.002 ^{††}	0.238 (0.011–0.464) 0.040 ^{††}	0.101 (.148–.847) 0.012 ^{††}	0.261 (0.078–.600) 0.131	\	\
Living area	\	\	\	\	\	0.246 (0.011–0.480) 0.040 ^{††}	\
Surgery type	-0.095 (0.142–1.843) 0.022 ^{††}	0.035 (0.123–1.564) 0.015 ^{††}	0.094 (0.156–0.346) 0.022 ^{††}	0.124 (0.472–1.345) 0.003 ^{††}	0.141 (0.132–0.607) 0.000 ^{††}	0.030 (-0.233 to 0.671) 0.391	0.054 (-0.212 to 0.342) 0.130
PMI	0.139 (0.152–0.835) 0.001 ^{††}	0.167 (0.294–1.085) 0.000 ^{††}	0.167 (0.231–0.906) 0.000 ^{††}	\	\	\	\
Did the nurse actively assess patient's pain	0.129 (0.361–1.706) 0.002 ^{††}	0.099 (0.139–1.700) 0.012 ^{††}	0.124 (0.294–1.636) 0.002 ^{††}	0.119 (0.361–2.415) 0.004 ^{††}	\	\	0.010 (-0.465 to 0.809) 0.789
Did patient know about pain	0.061 (0.145 to 0.620) 0.131	\	0.038 (-0.133 to 0.471) 0.242	0.128 (0.219–0.085) 0.002 ^{††}	\	-0.095 (-0.445 to -0.065) 0.010 ^{††}	-0.261 (-1.184 to -0.670) 0.000 ^{††}
Did patient get education from doctor or nurse	\	\	\	\	\	-0.040 (-0.575 to 0.211) 0.271	-0.200 (-1.714 to -0.804) 0.000 ^{††}
The attitude of doctor	-0.007 (0.896 to -0.208) 0.904	-0.066 (0.576 to -0.292) 0.565	0.098 (-0.111 to 0.276) 0.561	-0.071 (0.491–0.122) 0.223	0.076 (0.502–.070) 0.183	0.143 (0.039 to 0.280) 0.005 ^{††}	0.098 (-0.014 to 0.412) 0.060
The attitude of nurse	0.010 (0.134 to -0.212) 0.860	-0.146 (0.227 to -0.410) 0.277	-0.067 (-0.382 to 0.069) 0.241	0.006 (0.439–0.319) 0.916	0.063 (0.450–0.207) 0.271	0.344 (0.521 to 0.741) 0.000 ^{††}	0.167 (0.122–0.501) 0.001 ^{††}

* : R² = 0.077;† :R² = 0.121;‡ :R² = 0.081;§ :R² = 0.065;¶ :R² = 0.049;|| :R² = 0.259;** :R² = 0.224;- Significant at $\alpha = 0.05$.

Limitations

This study had some limitations. Due to time and location constraints, this study was conducted at only one hospital, and future large-sample, multicenter studies could be conducted to further refine the findings of this study. The degree of variance explained by the variables entered into the regression model in the study was low, so there were many other factors at play, such as the waiting time for pain relief. More factors should be included in future studies to more deeply explore the factors that could be modulated.

Conclusion

After more than a decade of development, the current status of pain management in China has improved compared to that in previous years; however, the incidence of moderate to severe pain remains high, and pain still has physical and psychological effects on patients. A multifactorial analysis of general information, pain management service factors, and pain treatment factors revealed a number of influencing factors, suggesting that special attention should be given to pain outcomes in patients with lower income and literacy levels. There is room for improvement in medical staff assessing patients for pain, providing health education about pain, and using positive pain management to reduce the pain of patients.

References

- Meissner W, Zaslansky R. A survey of postoperative pain treatments and unmet needs. *Best Pract Res Clin Anaesthesiol.* 2019;33:269–286. <https://doi.org/10.1016/j.bpa.2019.10.003>.
- Chou R, Gordon DB, de Leon-Casasola OA, et al. Management of postoperative pain: A clinical practice guideline from the American Pain Society, the American Society of Regional Anesthesia and Pain Medicine, and the American Society of Anesthesiologists' Committee on Regional Anesthesia, Executive Committee, and Administrative Council. *J Pain.* 2016;17:131–157. <https://doi.org/10.1016/j.jpain.2015.12.008>.
- Chinese Medical Association Anesthesiology Branch. Expert consensus on pain management after surgery in adults. *J Clin Anesthesiol.* 2017;33:911–917. <https://doi.org/CNKI:SUN:LCMZ.0.2017-09-024>.
- Aubrun F, Noutte-Gaulain K, Fletcher D, et al. Revision of expert panel's guidelines on postoperative pain management. *Anaesth Crit Care Pain Med.* 2019;38:405–411. <https://doi.org/10.1016/j.accpm.2019.02.011>.
- Grinstein-Cohen O, Sarid O, Attar D, Pilpel D, Elhayany A. Improvements and difficulties in postoperative pain management. *Orthop Nurs.* 2009;28:232–239. <https://doi.org/10.1097/NOR.0b013e3181b579ec>. quiz 240–231.
- Institute of Medicine. *Relieving Pain in America.* Washington (DC), USA: National Academies Press; 2011.
- Shen Q, Sherwood GD, McNeill JA, Li Z. Postoperative pain management outcome in Chinese inpatients. *West J Nurs Res.* 2008;30:975–990. <https://doi.org/10.1177/0193945908319576>.
- Shen Q, Li Z. A study on the reliability and validity of the Houston Pain Questionnaire. *Chin J Nurs.* 2006;41:1049–1051.
- Hu XJ. A study on the current status of pain control outcomes and influencing factors of inpatient cancer patients in Beijing's top three hospitals. *Peking Union Med Coll (Tsinghua Univ Sch Med) Chin Acad Med Sci.* 2010. <https://doi.org/10.7666/d.Y2123304>.
- Chen J, Tong Y, Cheng Y, Xue Z, Liu M. Establishment and empirical evaluation of a quality indicator system for postoperative pain management. *Pain Med.* 2020;21:3270–3282. <https://doi.org/10.1093/pm/pnaa221>.
- Xiao H, Liu H, Liu J, et al. Pain prevalence and pain management in a Chinese hospital. *Med Sci Monit.* 2018;24:7809–7819. <https://doi.org/10.12659/msm.912273>.
- Fletcher D, Fermanian C, Mardaye A, Aegerter P. A patient-based national survey on postoperative pain management in France reveals significant achievements and persistent challenges. *Pain.* 2008;137:441–451. <https://doi.org/10.1016/j.pain.2008.02.026>.
- Lorentzen V, Hermansen IL, Botti M. A prospective analysis of pain experience, beliefs and attitudes, and pain management of a cohort of Danish surgical patients. *Eur J Pain.* 2012;16:278–288. <https://doi.org/10.1016/j.ejpain.2011.06.004>.
- Gordon DB, Pellino TA, Miaskowski C, et al. A 10-year review of quality improvement monitoring in pain management: Recommendations for standardized outcome measures. *Pain Manag Nurs.* 2002;3:116–130. <https://doi.org/10.1053/jpmn.2002.127570>.
- Gerbershagen HJ, Aduckathil S, van Wijck AJ, Peelen LM, Kalkman CJ, Meissner W. Pain intensity on the first day after surgery: A prospective cohort study comparing 179 surgical procedures. *Anesthesiology.* 2013;118:934–944. <https://doi.org/10.1097/ALN.0b013e31828866b3>.
- Polanco-García M, García-Lopez J, Fàbregas N, Meissner W, Puig MM. Postoperative pain management in Spanish hospitals: A cohort study using the PAIN-OUT registry. *J Pain.* 2017;18:1237–1252. <https://doi.org/10.1016/j.jpain.2017.05.006>.
- Boekel R, Warlé MC, Nielen RGC, et al. Relationship between postoperative pain and overall 30-day complications in a broad surgical population: An observational study. *Ann Surg.* 2019;269:856–865. <https://doi.org/10.1097/sla.0000000000002583>.
- Taylor RS, Ullrich K, Regan S, et al. The impact of early postoperative pain on health-related quality of life. *Pain Pract.* 2013;13:515–523. <https://doi.org/10.1111/papr.12026>.
- Liu D, Ding Q, Tong Y, Zhang Z. Investigation on the status quo of postoperative pain nursing management in 164 hospitals in Shandong province. *Chin Nurs Manag.* 2016;16:1053–1056. <https://doi.org/10.3969/j.issn.1672-1756.2016.08.011>.
- He M, Wang XL, Feng Y. Evaluation of the implementation effect of pain training for clinical nurses. *Chin J Med Educ.* 2019;39:470–474.
- O'Donnell KF. Preoperative pain management education: An evidence-based practice project. *J Perianesth Nurs.* 2018;33:956–963. <https://doi.org/10.1016/j.jopan.2017.11.001>.
- Eshete M T, Baeumler P I, Siebeck M, et al. Quality of postoperative pain management in Ethiopia: A prospective longitudinal study[J]. *PLoS ONE.* 2019;14:e0215563. <https://doi.org/10.1371/journal.pone.0215563>.
- Xu LC, Li YL. Investigation and analysis of surgical nurses' pain recognition and attitude. *Chin J Pract Nurs.* 2019;33:1078–1081. <https://doi.org/10.3760/cma.j.issn.1672-7088.2017.14.009>.
- Tong Y, Liu M, Liu D, Wang H, Tian S. Evaluation and analysis of postoperative pain management quality in 5 tertiary hospitals. *Chin J Hosp Manag.* 2013;29:24–28. <https://doi.org/10.3760/cma.j.issn.1000-6672.2013.01.008>.
- Egbert AM, Lampros LL, Parks LL. Effects of patient-controlled analgesia on postoperative anxiety in elderly men. *Am J Crit Care.* 1993;2:118–124. <https://doi.org/10.4037/ajcc1993.2.2.118>.
- American Pain Society Quality of Care Committee. Quality improvement guidelines for the treatment of acute pain and cancer pain. *JAMA.* 1995;274:1874–1880. <https://doi.org/10.1001/jama.1995.03530230060032>.
- Li HY, Yin X, Liu T, et al. Analysis of the current status of postoperative pain control and the influencing factors of satisfaction. *J Nurses Train.* 2012;27:82–826. <https://doi.org/10.3969/j.issn.1002-6975.2012.09.027>.
- Schroeder DL, Hoffman LA, Fioravanti M, Medley DP, Zullo TG, Tuite PK. Enhancing nurses' pain assessment to improve patient satisfaction. *Orthop Nurs.* 2016;35:108–117. <https://doi.org/10.1097/nor.0000000000000226>. quiz 118–109.