

A Multi-centered Cross-sectional Study of Disease Burden of Pain of Inpatients in Southwest China

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Abstract

Background: Pain is a common burden of disease globally; yet, it is not systematically investigated in China, especially in hospitalized patients. This study was aimed at clarifying the epidemiological characteristics of pain and related factors in hospitalized patients in Southwest China.

Methods: A cross-sectional study was conducted to investigate the prevalence, severity, and influencing factors of pain and modes of postoperative analgesia in hospitalized patients from 17 hospitals in Southwest China. A prevalidated questionnaire was employed to calibrate all of these items within 3 days from March 18, 2015 to March 20, 2015.

Results: A total of 2293 patients were surveyed, the incidence of pain was 57.4% in all hospitalized patients at rest, of which 62.1% were with acute pain and 37.9% had persistent to chronic pain. Among surgical patients, 90.8% of them complained of acute postoperative pain at rest and 97.1% in motion. The incidence of acute postoperative moderate-to-severe pain was 28.8% at rest and 45.1% in motion. Surgical patients reported higher incidences of pain, especially acute and persistent pain compared with nonsurgical patients ($P < 0.05$). Postoperative pain occurred predominately at surgical sites (95.2%) as compared with nonsurgical sites (4.8%). Agedness, lower education level, surgery, and history of smoking were factors associated with increased duration and severity of postoperative pain and nonsurgical pain ($P < 0.05$).

Conclusions: Pain is a common burden of disease in China, of which surgical pain constituted an important component. Surgical patients complained more severe pain than those who did not undergo surgery. Postoperative analgesia still needs to be improved to control pain after surgery. Patients' perception might influence the efficacy of pain management, which should be implemented with a multidisciplinary approach.

Key words: Inpatients; Pain; Postoperative Pain

INTRODUCTION

According to the definition of International Association of Study on Pain (IASP), pain is “an unpleasant feeling occurring as a result of injury or disease, usually localized in some part of the body” and “the fifth vital sign,” it is often associated with impaired daily function and life quality.^[1,2] According to its duration, Pain could be divided into acute pain and chronic pain. The incidence of chronic pain was approximately 30.0% and up to 100 billion dollars were spent annually for its treatment in the United States.^[3] Within the entity of acute pain, postoperative pain accounted for 30.0–40.0%, which could reduce patients' satisfaction and delay postoperative recovery.^[4]

Due to discrepant perceptions toward pain, it is seldom recognized as a disease itself or even neglected by

some physicians. However, evidence has revealed that uncontrolled pain could lead to severe complications and impaired life quality.^[5] For example, postoperative pain after major joint surgery is serious, often resulting in delayed functional training after surgery.^[6] Previous data have shown that approximately 47.0% and 58.0% of patients complain of mild to severe pain after hip and knee surgery from postoperative day 1–3.^[7]

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Currently, the disease burden of pain is unclear in hospitalized patients in China, especially postoperative pain.^[6] Therefore, we conducted a large-sampled multi-centered cross-sectional study to clarify the characteristics, related factors, and impact of pain in Southwest China, with the goal of optimizing pain management for hospitalized patients in China.

METHODS

Study design

This study was approved by the Institutional Review Board of the First Affiliated Hospital of Chongqing Medical University (the organizing center) and carried out in 17 medical centers. These hospitals were categorized into three levels such as four university-affiliated hospitals, five hospitals at provincial level, and eight secondary hospitals for adult patients in Southwest China. The choice of the hospitals was based on geological distribution; all eligible hospitals were medical centers in the district they belonged to. A group of 60 investigators were responsible for the face-to-face interview. The investigators were medical staff who were trained with the questionnaire and communication skills. After informed consent, hospitalized patients were surveyed with the face-to-face interview.

Hospitalized inpatients were surveyed with predesigned questionnaire in Chinese. Experts in postoperative pain control (members of Chinese Society of Anesthesiology) and statistics (members of Biostatistics Section of Chinese Preventive Medicine Association) designed it, which contained three domain with 39 items: the baseline characteristics of patients (age, gender, educational background, and social and economic status; 19 items), pain characteristics (pain intensity, pain duration, analgesic satisfaction, and the modes of postoperative analgesia; 15 items), and the perception of analgesic medications and analgesia (5 items). Analgesic efficacy was assessed as patients' satisfaction and the pain intensity of surgical patients, each item was ordinal or continuous variable. Of 37 items required interview with the patients while 2 items need to be extracted from medical chart. Numerical rating scale for pain was used for the assessment of pain intensity. The questionnaire was initially used for the preliminary survey; during the preliminary survey, 100 patients in one of the medical centers were interviewed with the preliminary questionnaire; one day later, they were asked to finish the same items in the questionnaire. Internal consistency reliability was evaluated using the Cronbach's alpha coefficient, and a value >0.70 was regarded as good.^[8] Because there was no consensus on how to design a "best" questionnaire to measure the different dimensions of pain in hospitalized patients, the construct validity of this questionnaire was assessed by cross-checked by three experts in this field as "good-to-excellent" for the investigation of pain characteristics, analgesia, and associated factors.

According to the preliminary survey, the incidence of pain in hospitalized patients was 14.0%, and Cronbach's alpha coefficient was calculated as 0.73. Using the formula for calculation of sample size of cross-sectional study,^[9] the scheduled sample was calculated as 2500 for hospitalized patients, considering a dropout rate of 10.0%. This study investigated a total of 29 departments, among which 13 departments such as endocrinology, cardiology, and gastroenterology were classified as nonsurgical departments, while ophthalmology, gastrointestinal surgery, hepatobiliary surgery, orthopedics, cardiothoracic surgery, plastic surgery, otolaryngological surgery, oral and maxillofacial surgery, vascular surgery, breast and thyroid surgeries, urological surgery, gynecology, obstetrics, pain, postanesthesia care unit, and oncology were grouped into surgical departments. The inclusion criteria were 18–90 years old, cooperative with the interview. The exclusion criteria were patients who had cognitive dysfunction, acoustic dysfunction, and visual impairment; patients who were discharged before the survey was completed; and other conditions which made the inpatients not able to be interviewed.

Stratified random sampling was used for the enrollment of the patients. Each of the different hospitals was deemed as a "stratum". According to the number of the hospital beds and their proportion among all participating hospitals, different numbers of patients were sampled from each hospital. Computer-generated sequence was used for the sampling of patient in individual hospital according to patients' identification number. The survey of inpatients was conducted within 3 days, from March 18, 2015 to March 20, 2015. A face-to-face interview for the patients took about 15 min.

This study was conducted under the supervision of an independent auditor, who was responsible for training of one specialist in each hospital. Every day, the specialist checked the data of the previous day's patients. Assessment of pain characteristics, pain management, and demographic parameters must be confirmed by the specialist by random sampling in 15.0% of the surveyed patients. A sampled auditing of the surveyed patients was conducted by the auditor a week after the survey was completed by face-to-face or telephone interview. When there was disagreement between the auditor and the investigators, the auditor must solve this disagreement by discussion with the investigators. Data were double-entered by two statisticians with limitation of access and locked during statistical analysis. All investigators were trained with the questionnaires, the skills of personal interview.

Statistical analysis

The data was entered via EpiData 3.1 (EpiData Institution, Odense, Denmark), and statistically analyzed via SAS 9.2 (SAS Institution, NC, USA). All the variable data were analyzed descriptively; all the measurement data (visual analog scale scores of the patients, age, postoperative hospital stay, etc.) were presented as mean \pm standard deviation (SD) or median (interquartile range); all the enumeration data (postoperative mortality in-hospital,

incidence of postoperative thrombosis and postoperative pulmonary infection, etc.) were presented as total size of sample and percentage. Statistical analysis was performed with the Wilcoxon rank-sum test, Chi-square test, or Kruskal-Wallis test according to data distribution. A value of $P < 0.05$ was considered statistically significant.

RESULTS

Baseline characteristics

A total of 2293 patients participated in this survey, 2106 patients completed, and were included in the statistical analysis [Figure 1]. Among these patients, 56.3% were admitted in surgical departments and 43.7% in nonsurgical department. The range of the age were 18–90 years, the median age was 53 years. In total, 57.2% of the surveyed patients were female and 43.8% were male. A majority of the patients were educated in middle school or as bachelor (79.6%), patients educated with only primary school accounted for 17.2% of the whole population whereas only 3.2% of the patients reported with diploma of postgraduate education. Most of the patients were hospitalized in tertiary medical centers (71.6%) [Table 1].

Pain and associated factors

The incidence of pain was 57.4% for all inpatients at rest, of which 62.1% were with acute pain and 37.9% had persistent to chronic pain. Surgical patients complained higher incidence of pain compared with nonsurgical patients ($P < 0.05$). In total, 90.8% of the surgical patients complained of acute postoperative pain at rest and 97.1% in motion. The incidence of postoperative moderate-to-severe pain at rest was 28.8% and 45.1% in motion. Surgical patients reported higher incidences of acute and persistent pain than nonsurgical patients (<0.05) [Tables 2 and 3].

Agedness and lower educational level were factors associated with increased duration and severity of pain ($P < 0.05$). In-hospital surgery was associated with increased duration of pain ($P < 0.0001$). The severity of postoperative pain was associated with agedness, lower educational level, and history of smoking ($P < 0.05$) [Table 4].

Postoperative pain and analgesia

Opioid was used for 27.8% of nonsurgical patients and 53.8% of surgical patients. Postoperative pain occurred predominately at surgical sites (95.2%) when compared with nonsurgical sites (4.8%). The modes of postoperative analgesia were reported as patient-controlled analgesia (PCA) (70.6%), on time (1.8%), as necessary (27.6%) respectively. Rescue analgesia was provided mainly by anesthesiologists (61.2%) and surgeons (38.8%). The incidence of moderate to severe pain varied from 9.0% to 100% in different surgical departments [Tables 5 and 6].

Perception of pain and analgesia

For the perception of pain, 79.9% of surveyed patients attributed pain to treated disease. As for the efficacy of the analgesia, 81.1% of in-hospital patients were satisfied with

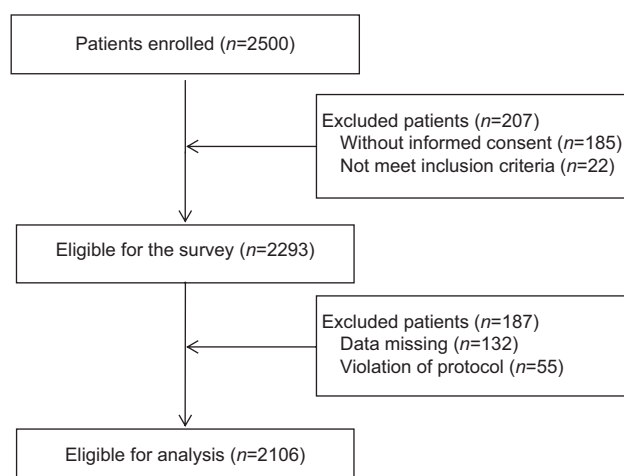


Figure 1: Flowchart of the study population selection.

Table 1: The demographic characteristics of hospitalized patients

Characteristics	Number of patients (n)	Proportion (%)
Departments		
Surgical	1185	56.26
Nonsurgical	921	43.74
Gender		
Female	1204	57.18
Male	923	43.82
Education		
Primary school	363	17.22
Middle school	902	42.82
Bachelor	774	36.74
Postgraduate	68	3.21
Marital status		
Married	1608	76.35
Divorced	472	22.39
Single	27	1.26
Monthly incomes (RMB, Yuan)		
≤1000	631	29.97
1001–3499	921	43.74
3500–9999	513	24.34
≥10,000	41	1.95
History of surgery		
Yes	815	38.69
No	1291	61.31
Tertiary center	1507	71.58
Nontertiary center	599	28.42

analgesia provided. The analgesic methods patients aware of were as follows: anti-inflammatory analgesic (88.4%), opioid (47.0%), PCA (29.4%), nerve block (28.1%), surgery treatment (22.6%), radiotherapy (20.0%), Chinese medicine treatment (9.0%), and radiofrequency treatment (6.2%). As for the perception of the analgesic medications, 50.1% of patients considered all analgesia medications has gastrointestinal side effects while 45.4% of the patients thought the use of these medications was associated with addiction.

Table 2: Severity of pain in hospitalized patients according to numerical rating scale

Pain intensity*	Preoperative surgical patients (n = 1185, %)	Postoperative surgical patients (n = 1185, %)	Nonsurgical patients (n = 921, %)	Overall patients (n = 2106, %) [†]	Statistical value [‡]	P
Pain at rest						
Mild	34.8	62.0	3.5	21.1	305	<0.0001
Moderate-to-severe	34.8	28.8	38.2	36.3	2.67	>0.05
Pain in motion						
Mild	–	52.0	–	–	–	–
Moderate-to-severe	–	45.1	–	–	–	–

*Mild pain was classified as NRS for pain <4 and ≥1, moderate-to-severe pain was assessed as NRS ≥4; [†]The incidence of overall patients was calculated by the addition of the incidence preoperative pain in surgical patients with that of nonsurgical patients at rest; [‡]The statistical value was χ^2 for the comparison of preoperative surgical patients with nonsurgical patients. –: No data were surveyed or calculated for this category; NRS: Numerical rating scale.

Table 3: The duration of pain in hospitalized patients

Pain duration	Surgical patients (n = 1185, %)	Nonsurgical patients (n = 921, %)	Overall patients (n = 2016, %)	Statistical values*	P
Acute pain	47.5	20.5	35.7	164.30	<0.01
Persistent pain	10.4	6.5	8.7	9.76	<0.01
Chronic pain	11.8	14.7	13.1	3.69	>0.05

Acute pain was defined as duration of pain <1 month, persistent pain as duration of pain between 1 month and 3 months, chronic pain as duration of pain >3 months; *The statistical value was χ^2 for the comparison of surgical patients with nonsurgical patients.

Table 4: The influencing factors of pain in adult in-hospital patients

Outcomes	Influencing factors	Statistical values	P
The incidence of pain	Surgery	12.8395*	0.0045
	Marital status	14.2121 [†]	0.0008
	Education	11.0240 [†]	0.0116
The duration of pain	Surgery	6.6179*	<0.0001
	Age	62.3916 [†]	<0.0001
	Education	10.0384 [†]	0.0182
The severity of surgical pain	Age	24.4075 [†]	0.0004
	Education	13.5905 [†]	0.0035
	History of surgery	1.9995*	0.0455
	History of surgery	2.1469*	0.0318
The severity of nonsurgical pain	Non-PCA analgesia	2.3811 [†]	0.0173
	Age	19.7517 [†]	0.0031
	Education	15.0912 [†]	0.0017
	History of smoking	2.0692*	0.0385

*The statistical value for Wilcoxon test, and [†]for Kruskal–Wallis test. PCA: Patient-controlled analgesia.

DISCUSSION

Although this survey was conducted in Southwest China, the results still mirrored the fact in China that hospitalized patients reported considerably high incidences of acute and chronic pain.^[10,11] The results of this study showed that the incidence of pain in hospital inpatients was over 50% and the characteristics of pain was associated with some socioeconomic factors. In the united states, a third of the population complained chronic pain, pain was also one of the main reasons for patients to seek healthcare in Europe.^[12,13] Despite some large-sampled

Table 5: Characteristics of postoperative pain and analgesia

Outcomes	Values
Sites of pain, n (%)	
Surgical field	1128 (95.2)
Nonsurgical field	57 (4.8)
Methods of analgesia, n (%)	
PCA	836 (70.6)
On time	21 (1.8)
As necessary	328 (27.6)
Routes of analgesia, n (%)	
Intravenous	927 (78.2)
Intrathecal	79 (6.7)
Peripheral nerve	7 (0.5)
Oral	31 (2.2)
Intra-muscular	110 (9.3)
Subcutaneous	31 (2.2)
Physicians responsible for pain management, n (%)	
Anesthesiologists	725 (61.2)
Surgeons	460 (38.8)
Hours after the procedures*, mean ± SD	21.4 ± 10.5
NRS for pain at rest, mean ± SD	2.0 ± 1.9
NRS for pain in motion, mean ± SD	3.4 ± 2.3
NRS for analgesic satisfaction [†] , mean ± SD	8.0 ± 1.9

*Hours after the end of surgery, at which time the assessment of pain carried out. Others were calculated with standard deviation; [†]A scale of 0–10 was used, 10 means perfect satisfaction while 0 means not satisfied with the postoperative analgesia. PCA: Patient-controlled analgesia; NRS: Numerical rating scale; SD: Standard deviation.

surveys for specific types of pain, to our knowledge, our study recruited a relatively large cohort of hospitalized patients surveyed for pain in China,^[14–16] Considering the low reporting rate and conservative perspective

Table 6: Characteristics of postoperative pain according to surgical types

Surgical departments	Number of patients (n)	Moderate-to-severe pain at rest (%)	Moderate-to-severe pain in motion (%)
Gastro-enteral surgery	112	17.9	40.2
Hepato-biliary surgery	107	29.9	44.9
Orthopedic surgery	244	26.6	44.3
Cardio-thoracic surgery	40	37.5	70.0
Pain management	15	100	100
Otolaryngology	66	9.0	36.4
Oral and maxillofacial surgery	26	30.8	53.8
Vascular surgery	27	40.7	40.7
Breast and thyroid surgery	60	26.7	33.3
Gynecology	151	29.1	41.7
Obstetrics	188	25.5	53.2
Urological surgery	90	34.4	41.1
Ophthalmology	35	45.7	34.3
Oncology	24	58.3	37.5

Patients investigated at postanesthesia care unit were redistributed into other categories according to types of surgery.

toward pain reporting, the incidence of pain might be underestimated.^[17]

According to IASP, the United States consume 80.0% of global opioids annually while its population accounts for only 4.6% of the world, indicating a gap between pain and its healthcare expenditure in our population.^[18] In this survey, we also found that the incidence and severity of postoperative pain were higher than preoperative and nonsurgical pain, these results have implications for pain management after surgery. Postoperative pain is one of the types of acute pain, which occurs immediately after surgery,^[19-21] worldwide, 80.0% of surgical patients reported postoperative pain, but only half of the patients were satisfied with postoperative analgesia.^[22-24] Postoperative pain impacts on the postoperative rehabilitation of patients after surgery. Without proper management, it might reduce patient satisfaction, increase the length of stay in hospital, or even lead to potentially serious complications.^[25-27]

This survey also highlighted the importance of patients' participation in effective pain management as patients could hold bias toward pain medications and reject the analgesia therapy. According to previous experience, education, timely assessment of pain and optimization of analgesic techniques, were beneficial for increasing patients' compliance and analgesic efficacy in Chinese patients.^[28,29] Taking postoperative pain as an example, currently, postoperative analgesia was mainly provided by anesthesiologists, yet, how surgeons evaluate and practice pain management also impacted on postoperative pain. If surgeons only administered analgesics according to the request of patients in a fixed pattern, inadequacy in dosages of analgesic medications or potency could prolong the

duration of severe pain and associated adverse events.^[29] Previous study also showed that nurse training about pain can significantly improve the effectiveness of pain management in surgical wards.^[30] A good postoperative analgesia team includes anesthesiologists, surgeons, nurses, with particular emphasis on the cross dialogue of all staff on efficacy and adverse events, therefore, the improvement of analgesia should be carried out at multiple levels.

This study had several limitations. First, this multicentered study was conducted as a cross-sectional survey, short period of investigation might be associated with recall bias of the patients, such as the duration of pain. Second, heterogeneity existed with respect to the time for the evaluation of postsurgical pain, which could affect the preciseness of the assessment. Third, the external validity of the questionnaire could be re-evaluated in future by comparing with other ones.

In summary, this study demonstrated the disease burden of pain, especially postoperative pain. Patients' perception might influence the efficacy of pain management, which should be implemented with a multi-disciplinary approach. More rigorous studies should be carried out to further clarify and improve pain management in China.

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Conflicts of interest

There are no conflicts of interest.

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