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]
Currently, the disease burden of pain is unclear in hospitalized patients in China, especially postoperative pain. 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. 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, 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 ± 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 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.
Despite some large-sampled surveys for specific types of pain, to our knowledge, our study recruited a relatively large cohort of hospitalized patients surveyed for pain in China.\cite{14,16} Considering the low reporting rate and conservative perspective.

**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 χ² 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 = 2106, %) | Statistical value* | 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 χ² 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 |
|                                 | Non-PCA analgesia   | 2.3811*            | 0.0173 |
| The severity of nonsurgical pain| 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.\cite{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.\cite{12,13} Despite some large-sampled surveys for specific types of pain, to our knowledge, our study recruited a relatively large cohort of hospitalized patients surveyed for pain in China.\cite{14,16} Considering the low reporting rate and conservative perspective...
Postoperative pain impacts on the world widely, 80.0% of patients in a fixed pattern, inadequacy in dosages surgeons only administered analgesics according to the pain management also impacted on postoperative pain. If anesthesiologists, yet, how surgeons evaluate and practice currently, postoperative analgesia was mainly provided by patients.

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. 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. A previous study also showed that nurse training about pain can significantly improve the effectiveness of pain management in surgical wards. 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.

### References

1. McNeill JA, Sherwood GD, Starck PL, Thompson CJ. Assessing clinical outcomes: Patient satisfaction with pain management. J Pain Symptom Manage 1998;16:29-40. doi: 10.1016/S0885-3924(98)00034-7.
Cancer-related pain: A pan-European survey of prevalence, treatment, and patient attitudes. Ann Oncol 2009;20:1420-33. doi: 10.1093/annonc/mdp001.

Fecho K, Miller NR, Merritt SA, Klauber-Demore N, Hultman CS, Blau WS. Acute and persistent postoperative pain after breast surgery. Pain Med 2010;11:347-53. doi: 10.1111/j.1526-4637.2009.00611.X.

Lin CC. Applying the American Pain Society’s QA standards to evaluate the quality of pain management among surgical, oncology, and hospice inpatients in Taiwan. Pain 2000;87:45-9. doi: 10.1016/S0304-3959(00)00267-0.

Fletcher D, Fermanian C, Mardaye A, Aegerter P; Pain and Regional Anesthesia Committee of the French Anesthesia and Intensive Care Society (SFAR). A patient-based national survey on postoperative pain management in France reveals significant achievements and persistent challenges. Pain 2008;137:441-51. doi: 10.1016/j.pain.2008.02.026.

Paul JE, Arya A, Hurlburt L, Cheng J, Thabane L, Tidy A, et al. Femoral nerve block improves analgesia outcomes after total knee arthroplasty: A meta-analysis of randomized controlled trials. Anesthesiology 2010;113:1144-62. doi: 10.1097/ALN.0b013e3181f4b18.

Marx RG, Menezes A, Horovitz L, Jones EC, Warren RF. A comparison of two time intervals for test-retest reliability of health status instruments. J Clin Epidemiol 2003;56:730-5. doi: http://dx.doi.org/10.1016/S0895-4356(03)00084-2.

Dupont WD, Plummer WD Jr. Power and sample size calculations. A review and computer program. Control Clin Trials 1990;11:116-28. doi: 10.1016/0197-2456(90)90157-w.

Sinatra R. Causes and consequences of inadequate management of acute pain. Pain Med 2010;11:1859-71. doi: 10.1111/j.1526-4637.2010.00983.x.

Chung JW, Wang TK. Prevalence of pain in a community population. Pain 2007;128:235-42. doi: 10.1016/j.pain.2006.00205.x.

Portenoy RK, Ugarte C, Fuller I, Hurlburt L, Jones EC, Warren RF. A comparison of two time intervals for test-retest reliability of health status instruments. J Clin Epidemiol 2003;56:730-5. doi: http://dx.doi.org/10.1016/S0895-4356(03)00084-2.

Dahl JB, Kehlet H. Postoperative pain and its management. In: McMahon SB, Koltzenburg M, editors. Wall and Melzack’s Textbook of Pain. New York: Elsevier, Churchill Livingstone; 2006. p. 635-51.

Hinrichs-Rocker A, Schulz K, Järvinen I, Lefering R, Simanski C, Neugebauer EA. Psychosocial predictors and correlates for chronic post-surgical pain (CPSP) – A systematic review. Eur J Pain 2009;13:719-30. doi: 10.1016/j.ejpain.2008.10.015.

Katz J, Seltzer Z. Transition from acute to chronic post-surgical pain: Risk factors and protective factors. Expert Rev Neurother 2009;9:723-44. doi: 10.1586/ern.09.20.

Fedoroff IC, Blackwell E. Speed B. Evaluation of group and individual pain management. In: Kehlet H, Jensen TS, Woolf CJ, editors. Persistent postsurgical pain: Risk factors and prevention. Lancet 2006;367:1618-25. doi: 10.1016/S0140-6736(06)67800-X.

Althaus A, Hinrichs-Rocker A, Chapman R, Arrázñez Becker O, Lefering R, Simanski C, et al. Development of a risk index for the prediction of chronic post-surgical pain. Eur J Pain 2012;16:901-10. doi: 10.1002/j.1532-2149.2011.00090.x.

Hudcova J, McNicoll E, Quah C, Lau J, Carr DB. Patient controlled opioid analgesia versus conventional opioid analgesia for postoperative pain. Cochrane Database Syst Rev 2006;CD003348. doi: 10.1002/14651858.CD003348.pub2.

Ying Ge T, Konstantatos AH, Cai Fang Z, Ying HJ, Ai Fen Y, Boyd D. Across-sectional exploratory survey of knowledge, attitudes and daily self-reported pain assessment practice among nurses in Mainland China. Pain Med 2013;14:1468-76. doi: 10.1111/pme.12156.

Wang ZQ, Zhan SY, Fransen M, Lin JH. Clinical attitudes towards pain treatment post-orthopedic surgery: A multicenter study in Beijing. Chin Med J 2012;125:2499-504. doi: 10.3760/cma.j.issn.0300-9999.2012.14.019.

Luo N, Qi W, Zhuang C, Di W, Lu Y, Huang Z, et al. A satisfaction survey of current medicines used for migraine therapy in China: Is Chinese patent medicine effective compared with Western medicine for the acute treatment of migraine? Pain Med 2014;15:320-8. doi: 10.1111/pme.12277.