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Pain Prevalence and Pain Management in a Chinese Hospital

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Background: Pain prevalence has been investigation in many developed countries, but integrated information about pain prevalence in Chinese hospitals is lacking. To achieve better pain treatment of hospitalized patients, pain management needs to be investigated. The present descriptive and cross-sectional study was performed to demonstrate the prevalence of pain by comparison with the 4 traditional vital signs, and to investigate pain management in a Chinese teaching hospital.

Material/Methods: Structured and systematic interviews were undertaken by independent researchers. During a patient's hospitalization, the prevalence of pain and the 4 vital signs were recorded. Then, the catalog, severity, causes, duration of pain, and pain management were assessed.

Results: We found: (1) 63.36% of patients (3248 in total) suffered from pain while in hospital, which was 1.8~2.8 times higher than the prevalence of abnormality of the 4 vital signs. (2) 76% of patients had moderate pain and 21.98% had severe pain. (3) Pain intensity differed among patients with different diseases, but did not differ by demographic factors. (4) Acute and chronic pain were present in 68% and 26% of patients, respectively. In addition, 16% of the patients had neuropathic pain. (5) More than half of the patients with pain refused to receive pain-relief medication because they worried about addiction to opioids and the adverse effects of analgesics. (6) Most medical staff properly understood the 3 ladder analgesics.

Conclusions: The prevalence of pain is higher than the abnormality of the 4 traditional vital signs in a Chinese hospital. Although pain management has broadly improved, more patient education is necessary.

MeSH Keywords: Epidemiologic Study Characteristics as Topic • Pain Management • Vital Signs

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Background

Pain has been described as "the fifth vital sign" since the late 1990s [1]. Indeed, as early as 2002 the International Association Study for the Pain (IASP) advocated recognizing pain intensity as the fifth vital sign, in addition to the traditional 4 vital signs of body temperature, blood pressure, pulse, and breathing [2]. During recent decades, important progress has been made in the study and treatment of several painful conditions, but pain is still underestimated and under-treated in medical practices [3–7], especially in developing countries [8]. As a result, the presence of pain among hospitalized patients is extensive, and significantly more would be expected.

Many epidemiological studies of pain prevalence have been made all over the world. Surveys from various developed countries reported pain prevalence ranging from 23% to 79% [9–16]. However, few surveys have focused on pain prevalence in Chinese hospitals or assessed the association between pain prevalence and the 4 traditional vital signs during hospital stay. In addition, the systemic investigation of pain management continues to be lacking. Therefore, this study was conducted to investigate whether the prevalence of the pain is higher than the other 4 traditional vital signs, as well as to assess the state of pain management in a Chinese hospital. If the results prove our hypothesis, then pain deserves more attention.

Material and Methods

Sample

This study was authorized by the Ethics Committee of the West China Hospital of Sichuan University. In this study, we surveyed all inpatients regarding their satisfaction with pain management. During 9 weeks (December 2013 to January 2014), several potential determinants of pain and analgesic therapy were investigated, include 66 care departments with a total of 3248 beds. Hospitalized patients were interviewed using a structured questionnaire. Written informed consent was required for participation. Exclusion criteria were: younger than 6 years of age; in the intensive care unit, psychiatric, or pediatric wards; who did not agree to participate in this study; or who had severe cognitive impairment, poor general condition, optical or auditory defects, or speech disorders.

Questionnaire

The interview questionnaire contained 5 parts: 1) basic demographic variables (gender, age, married status, address, educational level, and occupation), and ICD-10 diagnosis; 2) location and duration of the pain; 3) ID-pain scale; 4) daily pain intensity (0 to 100 Visual Analogue Scale), and the corresponding pain management and the satisfactory score in the pain management of the patients; 5) medical staff knowledge of pain-relief interventions.

Data collection

All interviews were conducted by independent researchers and were highly structured and systematic. More than 160 nurses, speaking in the local dialect, participated in face-to-face interviews. To be eligible as an interviewer in this study, these nurses all underwent special training. It was clear to patients that the interviewer was different and independent from other medical staff, especially when she/he introduced herself/himself as a nursing scientist and did not take part in patient care. At first admission, patients were asked whether they had experienced pain within the week prior to admission and at the time of the interview; if so, their pain intensity would be rated at rest (usually the least severity of pain), and on movement (usually the worst severity of pain) during the last 24 hours, on a visual analogue scale of 100 mm (VAS 0: no pain, VAS 100: worst pain) at the same time (at 4 pm) every afternoon. We also simultaneously asked patients to rate their satisfaction with pain management during the last 24 hours on a visual analogue scale of 100 mm (VAS 0: unsatisfied, VAS 100: excellent satisfaction). These assessments were repeated every afternoon during the entire hospitalization period. The 4 traditional vital signs were also assessed at the same time (at 4 pm). Patients were also asked to describe the predominant location, the origin, and duration of pain, as well as the effect of the analgesia. Chart analysis was performed among all participants to determine the frequency and timing of application of pain medications. Demographic data and ICD-10 diagnoses were collected as well.

The VAS scores were collapsed into mild, moderate, and severe categories of intensity by dividing the visual analogue scale: 1 to 39 was mild, 40 to 69 was moderate, and 70 to 100 was severe.

The criteria of abnormal vital signs were: any body temperature above 37°C, a systolic pressure under 90 mmHg or over 140 mmHg, diastolic pressure under 60 mmHg or over 90 mmHg, a pulse rate under 60 or over 100 beats per minute, and a respiration rate under 12 or over 25 breaths per minute [13,17].

The effect of analgesia was divided into 5 grades, anchored by grade 1 (excellent analgesic effect) and grade 5 (no analgesic effect).

Data analysis

All statistical data were processed using SPSS 18.0 software. Descriptive statistics were analyzed to illustrate data collected. In terms of identifying the trends and generating hypotheses, inferential non-parametric tests were used to describe the

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relationships between variables. All data analyses were two-tailed and the value of P<0.05 was regarded as statistically significant. Data cleaning was accomplished by examining outliers and consistency. The prevalence of pain was calculated as follows: Σ=the number of the patients with pain (pain scores >0)×the days they were on pain medication (pain scores >0)/Σ=the number of the patients enrolled×the total hospitalized days; the abnormal rate of the other 4 vital signs (temperature, respiration rate, pulse rate, and blood pressure) were calculated as follows: Σ=the number of patients with abnormal vital signs×the days when the vital signs were abnormal/Σ=the number of patients enrolled×the total hospitalized days. To study the influence of the potential determinants (age, sex, educational level, occupation, and married status) on the prevalence of pain severity, controlling for possible confounders (geographical areas), logistic regression models were used. The association between a determinant and the main outcome studied was expressed using odds ratios (OR) with 95% confidence interval (95% CI).

Results

Sample description

A total of 3248 patients from 66 units were enrolled. Among the respondents, 49% were women, 26.8% were elderly (>60 years), and mean age was 47.34±18.33 years (range: 16–95). An operation was performed in 58% (1876/3248) of subjects. Occupations and educational levels are shown in Table 1. Of the patients enrolled, 81.6% were married and 93.5% lived together with their spouses and children (Table 1).

Table 1. Baseline characteristics of patients with possible pain.

Characteristic	n	%
Age, years		
<18	225	6.9
18<x<59	2155	66.3
60<x<74	664	20.4
≥75	204	6.4
Sex		
Female	1606	49
Male	1642	51
Department		
Surgical	1876	58
Non-surgical	1372	42
Educational		
University education	834	25.7
Senior high school	461	14.2
Junior high school	1754	54
Below junior high school	199	6.1
Occupation		
Farmers	695	21.4
Company staff	637	19.6
Civil servant	188	5.8
Individual business	152	4.7
Service business	88	2.7
Others	1488	46

Comparison of the prevalence between pain and the other 4 traditional vital signs

Our results showed that 63.36% of patients (3248 in total) experienced pain (VAS ≥0) during hospitalization. The prevalence of moderate to severe pain (VAS ≥40) was 54.36% and 61.88% at rest and on movement, respectively. Abnormality of the 4 vital signs was significantly lower than that of the pain, with 35.91% in temperature, 33.69% in respiration rate, 22.14% in pulse rate, and 31.27% in blood pressure (Figure 1). The occurrence of pain, as well as of moderate to severe pain at rest and on movement, was significantly higher than that abnormal temperature, respiration rate, pulse rate, and blood pressure (p<0.05).

Catalog of the pain

We found that 26% (844/3248) of patients experienced pain for the first time lasting longer than 3 months and were diagnosed as having chronic pain; 68% of patients experienced pain lasting less than 1 month and were diagnosed as having acute pain, while only 6% of patients reported that the duration of their pain was 1–3 months.

The ID-Pain score also was utilized to evaluate these patients. Nearly 65% of the patient reported the score as –1~0, which indicated no neuropathic pain; 15.3% of the patients reported the score as 2–3, which indicated an association with neuropathic pain; and 1.16% of the patients reported the score as 4–5, which indicated a high association with neuropathic pain.

Pain intensity

All patients were assessed using the VAS scale. For the total trend, the average pain intensity scores differed between rest (12.73±20.80) and movement (37.40±24.10). According to the VAS score, 14.21% of patients showed mild pain, 79.20% had moderate pain, and 6.58% had severe pain at rest (least pain).

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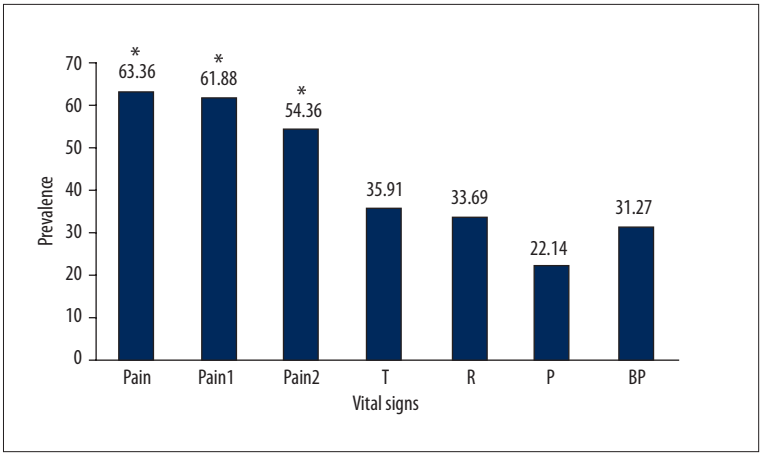

Figure 1. The prevalence of the pain and 4 traditional vital signs. Pain – prevalence of pain (VAS >0); pain 1 – prevalence of moderate to severe pain on movement (VAS ≥40 mm); pain 2 – prevalence of moderate to severe pain at rest (VAS ≥40 mm); T, R, P, BP – the prevalence of abnormal temperature, respiration rate, pulse rate, and blood pressure.

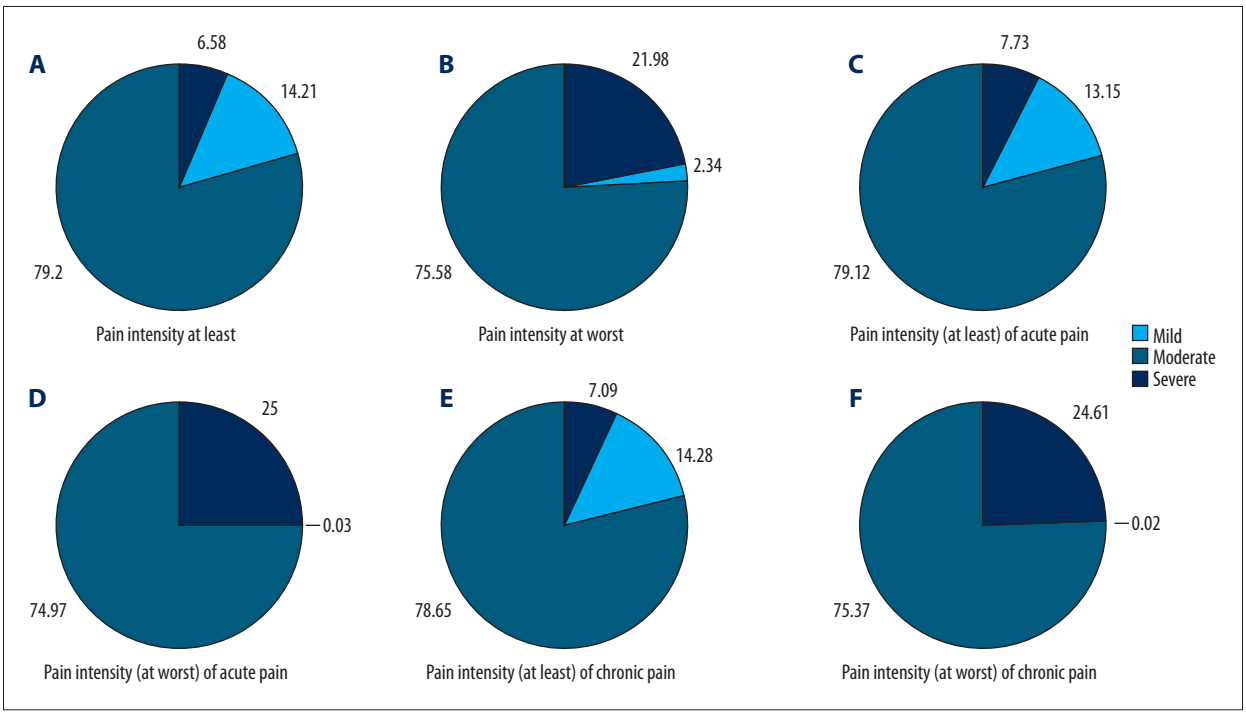

Figure 2. Pain intensity at rest (**A**), on movement (**B**), in acute pain (**C, D**), and in chronic pain (**E, F**). Mi – mild pain, Mo – moderate pain, Se – severe pain.

The percentage of patients with mild, moderate, and severe pain was 2.34%, 75.58%, and 21.98%, respectively, on movement (worst pain) (Figure 2A, 2B).

To explore the influence of the pain duration on the pain intensity score, we further investigated the score in patients with acute and chronic pain. We found that the mean pain intensity scores in acute pain between rest (least pain) and movement (worst pain) were 12.1±2.14 and 35.2±2.61, respectively. The percentage of patients being affected by mild to severe pain is shown in Figure 2C and 2D, respectively.

In addition, the mean pain intensity scores in patients with chronic pain between rest (pain at least) and movement (pain at worst) were 13.5±22.2 and 40.5±28.3, respectively. The percentage of the patients suffering from mild to severe pain is shown in Figure 2E and 2F, respectively.

Moreover, we found that the mean VAS scores was not significantly affected by age (at rest: r=0.035, $p>0.05$; on movement: r=0.049, $p>0.05$), gender (at rest: r=–0.017, p>0.05; on movement: r=–0.011, $p>0.05$), occupation (at rest: r=–0.041, $p>0.05$; on movement: r=–0.070, $p>0.05$), marital status (at rest: r=0.033, $p>0.05$; on movement: r=0.030, $p>0.05$), or educational level (at rest: r=0.0351, $p>0.05$; on movement: r=0.015, p>0.05).

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Table 2. Pain severity, patient percentage, and the prevalence of the duration >6 month of different diseases.

Diagnosis (ICD-10)	VAS at worst	VAS at least	Percent (%)	Prevalence with duration >6 mo. (%)
Congenital malformations, deformations, and chromosomal abnormalities	5.67±0.58	4±0.39	0.1	0
Diseases of the respiratory system	4.58±0.78	1.57±0.55	1.99	31.71
Pregnancy, childbirth, and puerperium	4.49±0.96	2.18±0.48	2.82	0
Diseases of digestive system	4.29±0.67	1.52±0.86	20.89	12.56
Diseases of nervous system	4.05±0.71	1.27±0.92	9.72	22.5
Endocrine, nutritional, and metabolic diseases	3.92±0.58	0.97±0.78	9.14	24.47
Diseases of the musculoskeletal system and connective tissue	3.76±0.81	1.38±0.79	15.35	32.91
Diseases of skin and subcutaneous tissue	3.70±0.37	1.14±0.39	1.26	3.85
Diseases of genitourinary system	3.54±0.64	0.99±0.54	11.76	11.16
Neoplasms	3.39±0.46	1.30±0.62	12.49	18.68
Diseases of circulatory system	2.88±0.54	1.04±0.74	6.61	13.24
Certain infectious and parasitic diseases	2.79±0.52	0.80±0.31	2.04	16.67
Diseases of eye and adnexa	2.16±0.49	0.96±0.28	5.2	6.54
Diseases of blood and blood-forming organs and certain disorders involving the immune mechanism	1.55±0.61	0.55±0.27	0.19	0
Diseases of ear and mastoid process	1.52±0.53	0.51±0.31	0.44	0

Percentage – number of the patients with each disease/the total enrolled patients (3248); prevalence with duration >6 mo.=the number of the patients with a pain duration >6 months of one disease/the total number of the patients of this kind of disease

However, mean VAS scores differed by disease diagnoses (at rest: r=0.059, p =0.008; on movement: r=0.070, p=0.002). Patients with congenital malformations, deformations and chromosomal abnormalities, respiratory system diseases, and the patients experiencing pregnancy, childbirth, and puerperium were more likely to experience severe pain (Table 2). In addition, patients with diseases of the digestive system, musculoskeletal system and connective tissue, and genitourinary system were more likely to report severe pain (percentage >10%) (Table 2).

Causes and localization of the pain

According to the ICD-10, the main causes of the pain were: diseases of the respiratory system (20.89%), diseases of the skin and subcutaneous tissue (15.35%), neoplasms (12.49%), diseases of the musculoskeletal system and connective tissue (11.76%), mental and behavioral disorders (9.72%), and endocrine, nutritional, and metabolic diseases (9.14%) (Table 2). Patients with musculoskeletal diseases had the highest prevalence of pain >6 months (32.91%), followed by those with respiratory diseases (32.71%), diseases of the endocrine, nutritional, and metabolic system (24.47%), and diseases of the nervous system (22.50%). About 19% of patients with neoplasm had pain lasting more than 6 months (Table 2).

Patients were also required to indicate the body area with the strongest pain, showing that pain was most prevalent in the thorax and abdomen (36.39%), lower extremities (27.49%), head/facial region (19.24%), and lower back (13.22%).

Pain management

Pain medication

Pain-relief medications were administered to 44.74% of patients (1453/3248) within the last 24 hours prior to the interview, and we compared the effects in patients with acute and chronic pain.

For patients with acute pain, 48.33% were administrated analgesics, while 21.47% and 1.25% of patients with moderate

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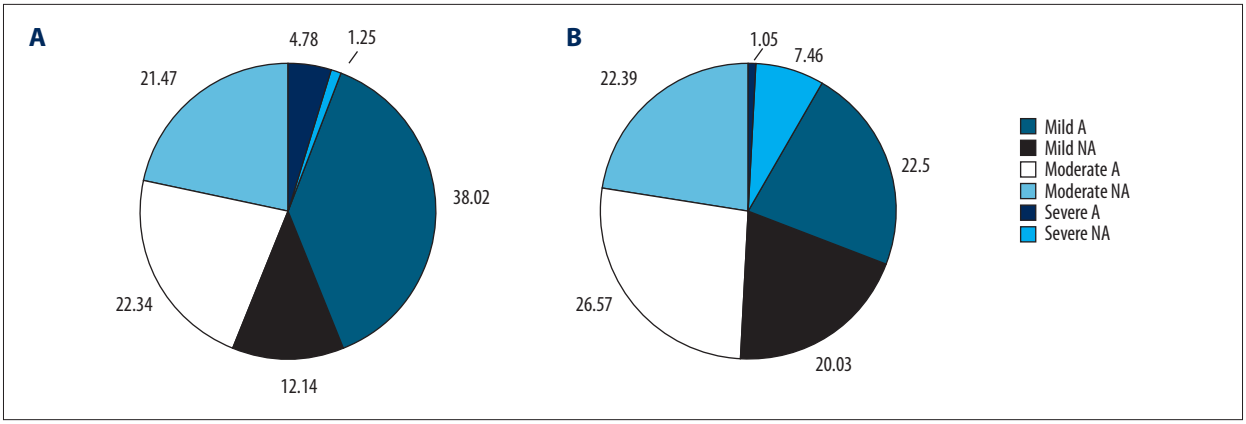

Figure 3. Administration of pain medications and pain severity in postoperative pain (**A**) and chronic pain (**B**). mild A – mild pain with analgesics, mild NA – mild pain without analgesics, moderate A – moderate pain with analgesics, moderate NA – moderate pain without analgesics, severe A – severe pain with analgesics, severe NA – severe pain without analgesic.

Table 3. The percentage of the pain medications used in the patients.

Medications	Acute pain			Chronic pain		
	Mild (%)	Moderate (%)	Severe (%)	Mild (%)	Moderate (%)	Severe (%)
Celebrex	9.58	2.94	4.17	20.45	9.65	
Diclofenac	0.83			6.82	2.63	
Meloxicam	1.25	2.94	2.08	3.41	7.02	8.33
Indometaxin	2.08	2.94		5.68	1.75	4.17
Parocoxib	8.75	3.53	2.08	13.64	6.14	4.17
Ketorolac			2.08	1.14	1.75	
Ibuprofen and codeine	1.67	5.29	8.33	3.14	1.75	
Tramadol	19.17	33.54	25.00	12.50	22.81	4.17
Bucinperazine	2.92	3.53	10.42	4.55	3.51	16.67
Oxycodone	0.83	1.18			1.75	4.17
Meperidine	20.83	17.65	14.58	12.50	5.26	8.33
Morphine	9.17	4.71	8.33	3.41	6.15	16.66
Fentanyl	2.91	1.18	2.08		7.02	8.33
Remifentanil	1.67	2.94		1.14	4.39	4.17
Sulfentanyl	7.08	8.24	2.08	4.55	7.89	4.17

The percentage of the pain medications used in patients with acute or chronic pain=number of patients who used one kind of medication in mild, moderate, or severe pain/the total patients of mild, moderate, or severe pain in acute or chronic pain.

and severe pain, respectively, refused analgesic treatment (Figure 3A). As shown in Table 3, tramadol and meperidine were the most commonly administered pain medications in patients with acute pain. Most patients with mild pain (41.66%) were treated with strong opioids, while about 25% of these patients received non-steroidal anti-inflammatory drugs (NSAIDs) or mild opioids (Figure 4A). Most patients with moderate or severe pain received mild opioids (44.72% and 45.83%, respectively), while only 34.72% and 27.08% of these patients received strong opioids (Figure 4A). Overall, from mild to severe pain, the percentage of the patients who received NSAIDs and strong opioids decreased, while mild opioids and adjuvants increased.

Postoperative pain was the most common type of acute pain, so we also investigated the related management and divided the analgesia effects into 5 grades, as described in the

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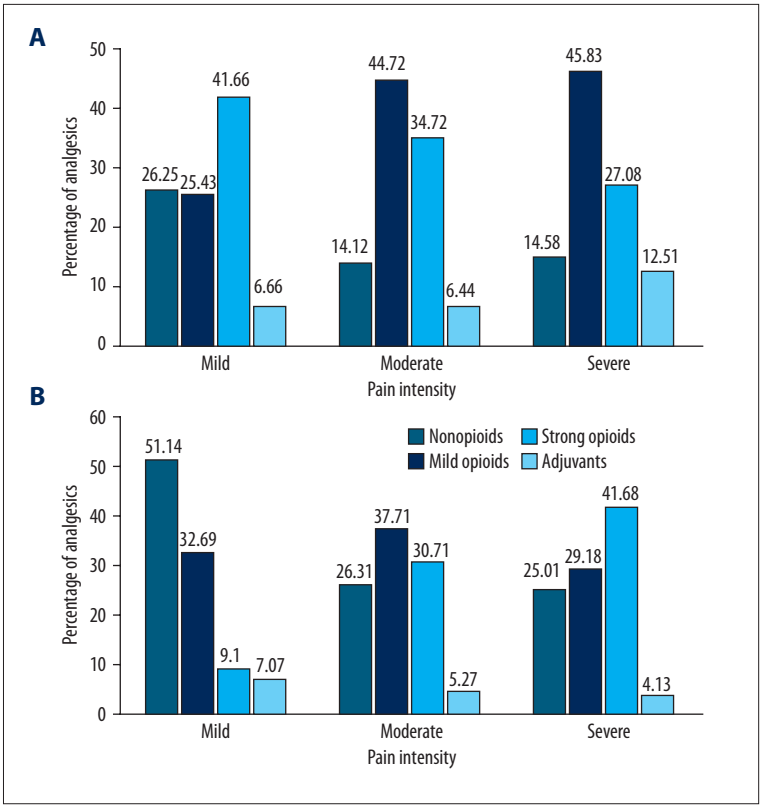

Figure 4. Type of analgesic taken by patients with acute pain (**A**) and chronic pain (**B**).

Methods section above. The results showed that 47.05% of patients received patient-controlled analgesia (PCA). Analgesia was mostly effective in the patients who received pain treatment. Additionally, as shown in Figure 5, of those receiving postoperative analgesia, over half of the patients (68.39%) rated the analgesic effect as grade 1 or 2 (excellent or good, respectively) during hospitalization, and only 6.13% of them reported the analgesic effect as grade 4 or 5 (little effect or no effect, respectively).

The effect of analgesia was divided into 5 grades, anchored by grade 1 (excellent analgesic effect) and grade 5 (no analgesic effect).

Nearly half (49.88%) of the chronic pain patients received pain medications; unfortunately, the percentage of patients refusing analgesic treatment was 22.39% and 7.46% in patients with moderate and severe pain, respectively (Figure 3B). As shown in Figure 5B, for mild pain patients, NASIDs were most commonly used (51.14%), of which 20.45% were Celebrex and 13.64% were parecoxib (Table 3). Most (37.71%) of the moderate pain patients received mild opioids such as tramadol. Most of the severe pain patients received strong opioids. Overall, ranging from mild to severe pain, the percentage of patients who received NSAIDs (51.14%, 26.31%, and 25.01%, respectively) and adjuvants (7.07%, 5.27%, and 4.13%, respectively) gradually decreased (Figure 4B), with NSAIDs declining dramatically.

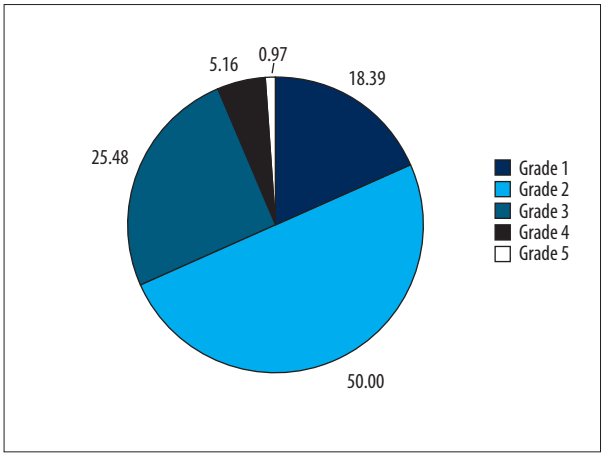

Figure 5. The postoperative analgesic effect. The effect of the analgesia was divided into 5 grades, anchored by grade 1 (excellent analgesic effect) and grade 5 (no analgesic effect).

Conversely, the application of strong opioids rose obviously (9.1%, 30.71%, and 41.68% in mild, moderate, and severe pain, respectively) (Figure 4B). Mild opioids were mostly used in the moderate pain patients (37.71%), as compared with the mild (32.69%) and severe pain (29.18%) patients (Table 3). The names of the pain medications are indicated in Table 3 and Figure 4B.

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Investigation of patients' understanding of pain management

In the process of exploring the patients' understanding of pain management, we found that 78.72% (2557/3248) of the interviewed patients had an intention to receive pain management and 60.33% of them worried about suffering from pain after being discharged. However, for the patients who refused to receive pain medications, 40.11% of them worried about the additional outcomes of opioids and the adverse effect of analgesics; thus, the majority of them (65.67%) tended to tolerate the pain. In addition, a few of them (2.42%) were concerned about the expense of analgesics.

The knowledge of analgesics to the clinic staff

The medical staff interviewed consisted of professors and associate professors (27.83%), attending physicians (24.48%), fellows (19.06%), and residents (28.63%). We regarded professors, associate professors, and attending physicians as "attending". Therefore, the clinic staff were divided into attending, fellows, and resident. The results showed that most of the attending, fellows, and residents understood and preferred use of meperidine (90.22% in attending *vs.* 87.74% in fellows and residents), tramadol (85.8% *vs.* 82.12), ibuprofen (79.98% *vs.* 75.35%), aminophenazone (78.81% *vs.* 83.27%), and indomethacin (77.3% *vs.* 77.97%). The data also revealed that strong opioids such as morphine (74.74% *vs.* 71.78%) and fentanyl (69.5% *vs.* 60.28%) were familiar to and understood by the majority of the medical staff (Table 4).

Satisfactions of patients with pain management

The mean satisfaction score of patients after pain management was 8.77±1.42. The mean score of the patient's satisfaction with pain care received was 8.76±1.46.

Table 4. Pain medication knowledge of clinical staff.

Medication	Knowledge in Attending (%)	Knowledge in Fellow and Resident (%)
Meperidine	90.22	87.74
Tramadol	85.8	82.12
Ibuprofen	79.98	75.35
Aminophenazoneco	78.81	83.27
Indometaxin	77.3	74.97
Morphine	74.74	71.78
Bucinperazine	72.06	68.2
Fentanyl	69.5	60.28
Codeine	66.36	66.19
Diclofenac	66.01	49.17
Meloxicam	64.61	53.77
Celebrex	59.6	57.22
Carbamazepine	57.39	53.77
Ketorolac	37.25	22.09
Ibuprofen and codeine	29.22	20.18
Sulfentanyl	21.89	20.69
Gabapendine	20.72	19.03
Parocoxib	18.74	21.2
Oxycodone	16.3	10.47
Pregabalin	14.2	12.39
Remifentanil	14.09	12.52
Aminophenazoneco	78.81	83.27

Knowledge of attending physicians (%): The percentage of attending physicians who know the medication out of the total interviewed attending; Knowledge of fellows and residents (%): The percentage of fellows and residents who know the medication out of the total interviewed fellows and residents.

Discussion

The need for appropriate assessment of pain as the fifth vital sign has been validated by studies in developed countries. Recently, this concept has reached developing countries like China. However, most Chinese hospitals do not widely document pain as the fifth vital sign. In this study, we mainly focused on the following: pain prevalence as compared with the other 4 traditional vital signs, catalog of pain, pain intensity and the cause and localization of pain, and pain management, with the aim of understanding pain systematically and holistically. The results revealed that the prevalence of pain was higher than that of the other 4 vital signs, and most of the pain is acute and moderate. We found that the major causes of pain were diseases of the respiratory system, the skin and subcutaneous tissue, musculoskeletal system and connective tissue, neoplasms, mental and behavioral disorders, endocrine disorders, and nutritional and metabolic diseases. Pain was most prevalent in the thorax and abdomen. Our assessment of hospital pain management indicated that patients need more information on pain management, and this lack of information may lead to higher prevalence of pain in hospitalized patients.

In recent years, it has been widely promoted among and accepted by most Chinese health professionals that it is important to care for patients' feelings and to aim to achieve a pain

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free hospital. As our data demonstrated, pain is quite common in diverse diseases with different intensities, so it is clear that pain should be monitored and documented as the fifth vital sign, and more attention should be paid pain management.

In the present study, the pain prevalence was 2 times higher than were abnormal rates of temperature, respiration rate, and blood pressure, and nearly 3 times higher than that of abnormal pulse rate. Moreover, the prevalence of moderate to severe pain at rest and on movement was 1.5~2.8 times higher than that of the 4 vital signs as well. Moreover, the prevalence recorded (63.36%) in our survey was notably higher than in previous studies [10–16,18,19]. A similar prevalence of pain was noted in some other studies aimed principally at assessing patient satisfaction with pain management in a sample of patients [20]. However, in those surveys, the prevalence of pain was assessed only once within the last 24 hours before the survey, which is somewhat like assessing "immediate pain at one timepoint". In our survey, we keep an ongoing assessment of pain during the whole hospitalization, which demonstrated the real prevalence of the pain during the hospitalization. This is somewhat like "the average pain during a period of time". Moreover, in our investigation, we also discovered that one-third of all patients had chronic pain and nearly two-thirds had acute pain. In addition, we simultaneously used the ID-Pain score to screen for neuropathic pain. The data indicated that 15.3% of patients with pain had neuropathic pain, and 1.16% of the patients revealed a high association with neuropathic pain. This suggests that the prevalence of neuropathic pain in our investigation was almost 16%. Recent reports show the prevalence of neuropathic pain ranges from 7% to 29.4% [13,21–26]. Thus, there was an average prevalence of neuropathic pain in our investigation compared to these studies in developed countries.

However, a conflicting result was found in our investigation, showing a high prevalence of moderate to severe pain in hospitalized patients. We also found a surprisingly high level of satisfaction with pain management. If the high prevalence of moderate to severe pain is related to the performance of medical staff, why did we find a surprisingly high satisfaction of patients with the pain management offered by medical staff? An explanation for this high prevalence could be the undertreatment of the pain. Moreover, in our investigation, we assessed clinic staff knowledge about pain medications, showing that opioids such as morphine, fentanyl, and fentanyl patch were familiar with most medical staff and that they preferred to use these medications. Compared with surveys in Germany and Italy [27,28], our data demonstrated that the knowledge and the attitudes of medical staff in China are substantially better. This might be one of the explanations of the high satisfaction of Chinese patients. In addition, although 78.72% of the patients interviewed had an intention to receive pain medications, 60.33% of them still worried about suffering from the pain after being discharged. In other words, less than half of patients with acute and chronic pain received analgesic medications. Of the patients who refused pain management, most (40.11%) had a fear of addiction to opioids and the adverse effect of analgesics; thus, most of them (65.67%) preferred to tolerate their pain without treatment. This indicates that the attitude of patients toward the pain medications contributes to the high prevalence of the moderate to severe pain. This suggests that common barriers to effective pain management in developing countries include the low priority given to pain management by government agencies, a lack of education in pain management, restriction of drug availability, patient concerns about cost, poor patient compliance, and patients' fear of addiction to opioids [8,17]. Our results revealed that educational strategies on pain management for patients themselves are expected to increase their knowledge of how to handle pain and change their attitudes toward pain-relief medications.

Although our data demonstrated that the knowledge and attitudes of medical staff in China are significantly improved in pain medicine, the details of the use of pain medications are not optimistic, especially in acute pain (postoperative pain). Figure 4A clearly shows in that a higher percentage of strong opioids is used in patients with mild pain, and the administration of strong opioids decrease tendency from mild pain to severe pain. One explanation for this tendency is that mild pain might be over-treated while moderate and severe pain might be under-treated. Another explanation might be that because of the common use of strong opioids, the pain intensity remains mild, while the patients with moderate and severe pain need stronger opioids. Because the questionnaire we used was designed to record all the analgesics used during the entire hospitalization, it is hard to identify which of these explanations is most reasonable. However, it is obvious that moderate and severe acute pain is under-treated, while in chronic pain patients, the data showed a tendency matching the WHO "three-step analgesic ladder" principle. The explanation of the difference between acute pain and chronic pain might be the consultation of pain physicians.

In our hospital, the chronic pain patients consulted the pain physicians more frequently than did the acute pain patients, so they could receive pain-relief medications as pain the physician's suggested. Although there is an Acute Pain Service (APS) in our hospital, the APS could not offer quick consultation to the acute pain patients due to the large population of postoperative pain patients and the complicated characteristics of postoperative pain. Therefore, the multi-disciplinary medical staff acted as the APS when the APS was not immediately available. This indicates that it is necessary to standardize the use of pain medications in multi-disciplinary staff.

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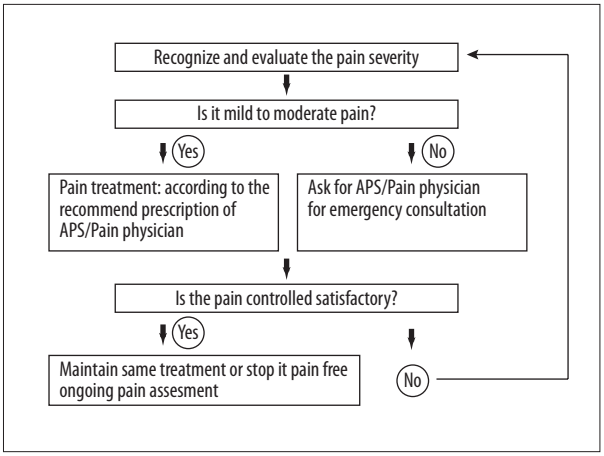

Figure 6. The protocol of pain management in West China Hospital.

Given the high pain prevalence and the suboptimal pain management, it is necessary to consider pain intensity as the fifth vital sign, so as to advance the knowledge of pain-relief medications of the multi-disciplinary medical staff. The protocol we recommended to start in our hospital is shown in Figure 6. In this protocol, an ongoing pain assessment is required and the pain management is performed by the multi-discipline staff under the recommended guidance when the patient is in mild to moderate pain. When the patient is in severe pain, an emergency APS/pain physician consultation is required and corresponding management should be offered by the APS/pain physician.

A limitation of our investigation is the way we assessed patient satisfaction with pain management. The satisfaction was investigated by the training nurse, not by an independent interviewer, which may have increased the reported rate of satisfaction. In addition, patients may be concerned about that less medical service would be offered to them if they gave a lower score of satisfaction. Another limitation is that this study was performed in a single center. Our experience and the study results strongly support the necessity of a multicenter investigation of this topic in China.

Conclusions

In conclusion, this study discovered that pain was more prevalent than abnormality of the other 4 traditional vital sign in a Chinese teaching hospital. Consequently, it is reasonable to regard pain intensity as the fifth vital sign in developing countries, including China. In addition, related reports on pain management show that pain intensity should be assessed systematically and methodically to determine the exact amount of analgesics that patients need according to their pain intensity, thereby evaluating the outcomes after medications. Furthermore, we also found that knowledge and positive attitudes of professionals regarding pain management have significantly improved, which leads to higher patient satisfaction. However, educational strategies on pain management for patients are still urgently needed to break down their stereotypes and develop an awareness of problem solving.

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Competing interests

None.

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