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Original Article

Pain Management by Nurses in Level 2 and Level 3 Hospitals in China

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ABSTRACT

Background: Pain management practice differs among hospitals in China; however, no studies have examined the association between hospital level and nursing practice of pain management.**Aims:** To evaluate the nursing practice of pain management in orthopedics wards of level 3 and 2 hospitals and compare the differences in pain management regulations, policies, and perceived barriers.**Design:** This was a cross-sectional descriptive study.**Setting:** This study was conducted during the 10th International Congress of the Chinese Orthopedic Association, November 19–22, 2015.**Participants:** Subjects: The sample included 121 nurses from China.**Methods:** Quantitative research methods were used to assess pain management practice by 121 Chinese nurses as well as barriers to nursing practice.**Results:** Nurses in level 3 hospitals were more likely to evaluate patients' pain intensity (85.23% vs. 65.38%, $p < .05$) and quality (77.27% vs. 53.85%, $p < .05$) than those in level 2 hospitals. Compared with level 2 hospitals, level 3 hospitals were more likely to participate in the Painless Orthopedics Ward program (53.41% vs. 23.08%, $p < .01$), conduct pain management knowledge training (88.64% vs. 69.23%, $p < .05$), and establish pain management regulations (68.18% vs. 34.62%, $p < .01$). Level 2 hospital nurses reported a higher score for barriers than level 3 hospital nurses (3.27 vs. 2.45, $p < .05$).**Conclusions:** Nurses from level 2 hospitals received less education on pain management and also paid less attention to and faced more restrictions for pain management than nurses from level 3 hospitals.

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Pain is one of the most common symptoms noted in patients in the orthopedics ward. Both orthopedic surgery and bone fracture need adequate pain control (Majuta, Longo, Fealk, McCaffrey, & Mantyh, 2015), especially total hip arthroplasty and total knee arthroplasty, both of which can cause severe postoperative pain (Fuzier, Rousset, Bataille, Salces-y-Nedeo, & Magues, 2015). However, pain control is often poor in the orthopedics ward. A previous study reported that 96.1% of patients experienced pain 2 weeks

after orthopedic surgery (Wang, Zhan, Franssen, & Lin, 2012), and nearly one-half of the patients experienced persistent pain 3 months after surgery (Fuzier et al., 2015). Inadequate pain management can interfere with effective rehabilitation and wound healing, which may lead to serious clinical outcomes such as deep vein thrombosis, pulmonary embolism, coronary ischemia, pneumonia, and chronic pain (Cordts, Grant, Brandt, & Mears, 2011; Majuta et al., 2015). A study was needed to investigate the nursing practice of pain management in the orthopedics wards.

Literature Review

Nurses' Role in Pain Management

Nurses play a pivotal role in effective pain management because they spend more time with patients than other health care professionals (Lui, So, & Fong, 2008). They are responsible for pain screening and assessment, intervention, and reevaluation of pain management, which are essential for positive patient outcomes

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(Courtenay & Carey, 2008; Registered Nurses' Association of Ontario [RNAO], 2013; Subramanian, Allcock, James, & Lathlean, 2012). Unfortunately, more than one-third of the nurses do not document their patients' pain on the first day of surgery (Abdallah, Majali, & Bergbom, 2008). Moreover, the pain intensity scores reported by nurses were significantly lower than those reported by the patients (Yıldırım et al., 2015), indicating that the nurses tended to underestimate patient pain.

Obstacles in Effective Pain Management

To explore the factors that hinder effective pain management in orthopedics wards, the following barriers have been identified: inadequate training, knowledge deficits, unhelpful staff and patient attitudes, poor pain assessment, fear of analgesic side effects, and lack of accountability (Duke, Haas, Yarbrough, & Northam, 2013; Taylor & Stanbury, 2009). Some studies highlighted the fact that organizational features of the health care system, such as the type of triage system and emergency department crowding, could be a reason for poor pain management (Ying Ge et al., 2013; Zhang et al., 2015). Herein we assumed that the hospital level is another important organizational feature that could lead to poor pain management in China. Hospitals in China are divided into three levels: level 3 hospitals provide more specialized medical services and perform a pivotal role in medical education and scientific research; level 2 hospitals offer less-specialized medical services and limited training for health professions; and level 1 hospitals only provide basic medical care in certain communities (Ying Ge et al., 2013). Specifically, the accreditation standards of the three-level hospital system, established by the National Health and Family Planning Commission of the People's Republic of China in 2011, recommend pain management and continuing improvement as standards for three-level hospitals (Chinese Hospital Association, 2011). To date, no studies have focused on the differences in pain management practice among different levels of hospitals, which could lead to a profound influence on the nurses' attitude and practice.

Pain Management Practice in Mainland China

In Mainland China, many studies have suggested that pain management remains unsatisfactory across all wards in hospitals (Liu et al., 2016; Zhang et al., 2015). Approximately 78% of patients experience moderate to severe pain 24 hours after surgery (Shen, Sherwood, McNeill, & Li, 2008), whereas less than one-fourth of the nurses evaluate pain intensity, quality, site, onset and course among their patients with pain (Ying Ge et al., 2013). Several measures have been adopted to improve this situation, one of which is the Painless Ward program. The concept of the Painless Ward or the "ouchless place" was first proposed by Schechter et al. (Schechter, Blankson, Pachter, Sullivan, & Costa, 1997) and further developed by Chinese nurses (Huang et al., 2011; Li, 2012). Huang et al. established a "painless unit" in an orthopedics ward and provided evidence of the effect of this measure on the nurses' knowledge and skills regarding pain management (Huang et al., 2011). However, research on pain management nursing practice in the orthopedics ward is still lacking in Mainland China. Therefore this study aimed to compare the nursing practice of pain management in the orthopedics ward among different levels of hospitals and propose a standard process of pain management for orthopedic nurses from 23 provinces of Mainland China.

Materials and Methods

Participants

Questionnaires were administered to 121 nurses during the 10th International Congress of Chinese Orthopedic Association in November 19–22, 2015. Nurses were included if they were registered nurses with at least 1 year of working experience, members of the Chinese Orthopedic Association, and working in the orthopedics ward in public hospitals in China. Appropriate information about the study was provided to each participant, and completion of the survey was considered implied consent. The participation in the study was voluntary, and the responses were confidential and anonymized. The study was approved by the Institutional Review Board of Sir Run Shaw Hospital, Hangzhou, China.

Instruments

The questionnaire was designed according to a previous study (Ying Ge et al., 2013) and discussion among five experienced nurses. The questionnaire was then pilot tested with another seven experienced nurses and modified to improve clarity, face validity, and content validity (Burns et al., 2008; Burton & Mazerolle, 2011; Hardesty & Bearden, 2004).

The final questionnaire included 25 questions. Demographic items include age, sex, education level, years of working experience, professional ranks, region, hospital level, and training on pain management. Receipt of training on pain management was categorized as a binary response (yes/no). Respondents who answered "yes" were asked about their training methods with a multiple choice question.

The first part of the questionnaire was designed to investigate the practice of pain assessment, treatment, and patient education with a 4-point Likert scale (1, never; 2, applicable to ≤50% patients; 3, applicable to >50% patients; 4, applicable to all patients). Seven questions were designed to capture information regarding pain assessment, two focused on treatment, and two were about patient education. The second part of the questionnaire, comprising four questions, collected information on the supportive environment and regulations of nursing practice. The level of doctors' support for pain treatment was assessed using a similar 4-point Likert scale (1, never; 2, applicable to ≤50% doctors; 3, applicable to >50% doctors; 4, applicable to all doctors). The third part of the survey used a binary response (yes/no) to collect information about the pain management policy, the Painless Orthopedics Ward program, and training of pain management in their hospitals. Lastly, the survey investigated the barriers of pain management with a multiple choice question.

The complete questionnaire is provided as [Supplementary Material \(S1\)](#).

Data Analysis

Respondents' characteristics were reported as means and standard deviations (SD) for continuous variables, or percentages for categorical variables. The sum of "training methods" and the sum of "barriers of pain management" selected by each respondent were calculated and named: "score of training methods" and "score of barriers," respectively. For responses to the practice of pain assessment, treatment, patient education, and the doctors' support for pain treatment, we computed and reported the proportions of nurses who chose either "applicable to >50% patients/doctors" or "applicable to all patients/doctors." Answers of nurses from level 3 hospitals were compared with those from level 2 hospital nurses

Table 1
Demographic Data of Respondents

	All		Level 3		Level 2		<i>p</i>
<i>N</i>	114		88		26		
Age ± SD	35.04 ± 6.50		34.81 ± 6.724		35.85 ± 5.690		.476
Years of working experience (±SD)	14.68 ± 7.67		14.17 ± 7.964		16.38 ± 6.438		.152
Educational level	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	
College diploma	23	20.18	16	18.18	7	26.92	
Bachelor's degree	86	75.44	67	76.14	19	73.08	
Master's degree	5	4.39	5	5.68	0	0.00	.352
Professional ranks							
Primary nurse	39	34.21	32	36.36	7	26.92	
Senior nurse	56	49.12	39	44.32	17	65.38	
Junior nurse	19	16.67	17	19.32	2	7.69	.167
Region							
Eastern region	30	26.32	24	27.27	6	23.08	
Central region	21	18.42	18	20.45	3	11.54	
Western region	63	55.26	46	52.27	17	65.38	.492
Whether receiving any type of training							
Yes	99	86.80	80	90.90	19	73.10	
No	15	13.20	8	9.10	7	26.90	.041
No. receiving any type of training (±SD)	1.56 ± 1.039		1.70 ± 1.030		1.08 ± 0.935		.006

SD = standard deviation.

using the χ^2 test or Fisher exact test (for categorical variables) and the *t* test (for continuous variables). Two-sided *p* values <.05 were considered statistically significant. All statistical analyses were performed using SPSS Version 18.0 software (SPSS Inc., Chicago, IL, USA).

Results

Among the 121 eligible nurses, 114 completed and returned the questionnaires (94.2% response rate). A survey was considered to be complete if >80% items were completed (AAPOR, 2016).

Demographic information of the respondents is described in Table 1; all were women and came from 23 provinces of Mainland China. Most respondents (64.9%) came from level 3 hospitals, whereas the rest were affiliated to level 2 hospitals. Compared with level 2 hospital nurses, those from level 3 hospitals received more training on pain management (90.90% vs. 73.10%, *p* < .05) and reported a higher score of training methods (1.70 vs. 1.08, *p* < .01). Level 3 hospital nurses also reported that they received more hospital training or department training when compared with level 2 hospital nurses (Fig. 1). No significant differences were noted in age, years of working experience, educational level, professional ranks, and region.

Practice of Pain Assessment, Treatment, and Patient Education

Table 2 shows the nurses' pain evaluation practice. A total of 76.32% nurses screened pain for more than 50% patients upon admission. The percentage of recording pain assessment and performing pain reassessment after pain treatment were similar (78.95% vs. 83.33%). No difference was detected in the responses to these questions among nurses from different levels of hospitals. For the listed elements of pain assessment, the most common selected elements were pain location, intensity, and quality, followed by pain duration and the effect on functional exercises. Only a small number of nurses evaluated the effect of pain on functional exercises, especially level 2 hospital nurses (38.46%). Furthermore, level 3 hospital nurses were more likely to evaluate patients' pain intensity (85.23% vs. 65.38%, *p* < .05) and quality (77.27% vs. 53.85%, *p* < .05) than those in level 2 hospitals. Although the differences were not significant, a similar trend was observed in other elements of pain assessment, including pain location, duration, and effect on functional exercises, suggesting that level 3 hospital nurses might pay more attention to pain assessment than those in level 2 hospitals.

Compared with nurses from level 2 hospitals, more nurses in level 3 hospitals reported that >50% of patients receive immediate treatment when they have moderate or severe pain (95.46% vs.

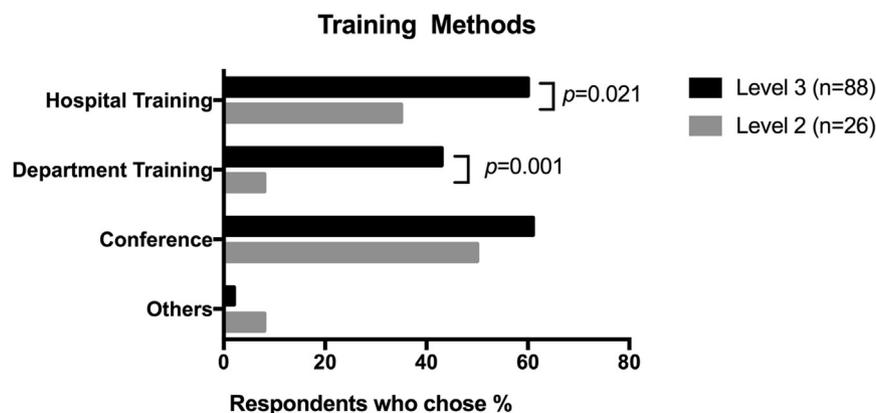


Figure 1. Training methods. The frequencies of the training methods are based on the question "Have you attended any trainings of pain management nursing? If yes, Please continue to answer in which way you accept the training?" A *p* value < .05 indicates significant differences between level 3 and level 2 hospitals.

Table 2
Comparison of Pain Assessment, Treatment, and Education to Patients Among Nurses From Different Hospital Levels

	All (114)		Level 3 (88)		Level 2 (26)		p
	N [*]	% [†]	N [*]	% [†]	N [*]	% [†]	
Pain assessment							
Screen for pain on admission	87	76.32	69	78.41	18	69.23	.431
Record pain assessments	90	78.95	72	81.82	18	69.23	.179
Perform pain reassessment after pain treatment	95	83.33	76	86.36	19	73.08	.136
Evaluate pain location among patients with pain	100	87.72	79	89.77	21	80.77	.304
Evaluate pain intensity among patients with pain	92	80.70	75	85.23	17	65.38	.044
Evaluate pain quality among patients with pain	82	71.93	68	77.27	14	53.85	.026
Evaluate duration of pain among patients with pain	71	62.28	57	64.77	14	53.85	.360
Evaluate effect of pain (on functional exercises) among patients with pain	62	54.39	52	59.09	10	38.46	.076
Pain treatment							
Patients received immediate treatment	104	91.23	84	95.45	20	76.92	.009
Patient education							
Educate inpatients about the correct concept of pain treatment	86	75.44	72	81.82	14	53.85	.009
Educate discharged patients about the notes of analgesic agents	87	76.32	67	76.14	20	76.92	>.999

* Numbers of nurses who chose applying to >50% or each patient for the selected items.
† Percentage of nurses who chose applying to >50% or each patient for the selected items.

76.92%, $p < .01$). The most common method of pain treatment was oral analgesic administration (Fig. 2).

The percentage of nurses educating inpatients about the correct concept of pain treatment was similar to that of educating discharged patients about analgesic agents. However, unlike education to discharged patients (no significant difference), level 3 hospital nurses were significantly more likely to educate inpatients about concept of pain treatment than level 2 hospital nurses (81.82% vs. 53.85%, $p < .01$).

Supportive Environment, Regulations, and Policies of Nursing Practice

Table 3 illustrates the differences in the pain management environment, regulations, and policies between level 3 and level 2 hospitals. Compared with level 2 hospitals, level 3 hospitals were more likely to participate in the Painless Orthopedics Ward program (53.41% vs. 23.08%, $p < .01$), conduct pain management knowledge training (88.64% vs. 69.23%, $p < .05$), and establish regulations for pain management (68.18% vs. 34.62%, $p < .01$). A total of 85.09% surveyed nurses declared that >50% doctors supported pain treatment in their wards, although the difference was not significant between level 3 and level 2 hospitals ($p > .05$).

Perceived Barriers of Pain Management

The barriers of pain management identified by nurses are presented in Figure 3. Level 2 hospital nurses were more likely to

encounter barriers such as “lack of complete regulations” (26.14% vs. 65.38%, $p < .01$) and “insufficient training” (44.32% vs. 69.23%, $p < .05$) than those in level 3 hospitals. Similar trends were identified for most other barriers, although the differences were not significant. Furthermore, respondents in level 2 hospitals reported a higher score for barriers than those in level 3 hospitals (3.27 vs. 2.45, $p < .05$), indicating that level 2 hospital nurses had encountered more barriers during their nursing practice.

Discussion

This is the first investigation of nurses' pain management practice in the orthopedics wards. Respondents were from 23 provinces in Mainland China, and therefore they were representative of Chinese nurses. The pain management practice in different levels of hospitals remains unknown. Our study is, to our knowledge, the first to identify that hospital level is an important factor of nurses' education, training, and pain management practice. Our results indicate that patients in level 2 hospitals received less pain evaluation and treatment than those in level 3 hospitals.

Pain management is a concerning issue in Western countries. Recent studies mainly focused on pain in older adults, cancer pain, and postoperative pain (Choi, 2016; Paice, 2016; Rastogi & Meek, 2013). To manage pain effectively, the Joint Commission International (JCI) Accreditation Standards and the American Pain Society recommend that health care professionals should screen each patient's pain (Gordon et al., 2005; Joint Commission Resources, 2014). In China the former Ministry of Health introduced

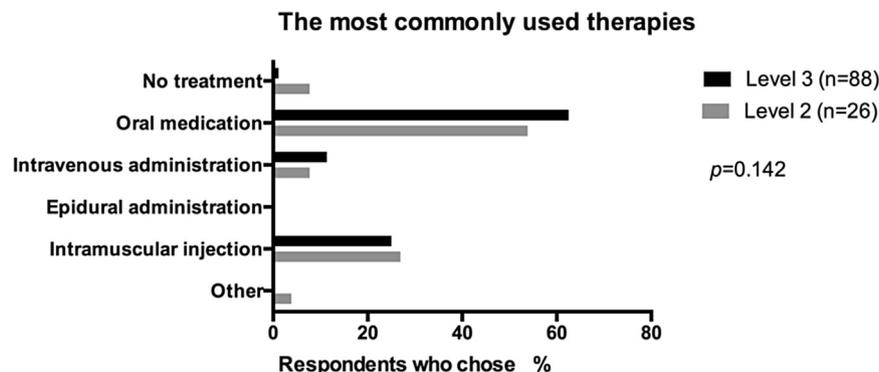


Figure 2. The most commonly used therapies. The frequencies of the therapies are based on the question “If you take the immediate measures to treat patient who had moderate or severe pain, which method would you choose?”

Table 3
Comparison of Pain Management Regulations and Policies Among nurses From Different Levels of hospitals

	All (114)		Level 3 hospitals (88)		Level 2 hospitals (26)		p
	N*	% [†]	N*	% [†]	N*	% [†]	
Participate in the "Painless Orthopedics Ward" program	53	46.49	47	53.41	6	23.08	.007
Carry out pain management knowledge trainings	96	84.21	78	88.64	18	69.23	.029
Establish the regulations of pain management	69	60.53	60	68.18	9	34.62	.003
More than 50% or each doctors support pain treatment	97	85.09	77	87.50	20	76.92	.213

* Numbers of nurses who chose applying to >50% or each patient for the selected items.

[†] Percentage of nurses who chose applying to >50% or each patient for the selected items.

Implementation Details of the Three-level Hospital Accreditation Standards in 2011 and suggested pain management and continuous improvement as a standard of review for level 3 hospitals (Chinese Hospital Association, 2011), which covered five main aspects: pain treatment standards, established regulations, education and informed consent, prevention of complications and risks, and periodic evaluation. However, our study found that only three-quarters of Chinese orthopedic nurses screened pain for >50% patients, indicating that the rest of the respondents did not consider pain screening as a part of their routine job. Pain screening deserves more attention, as multiple orthopedic diseases or operations are associated with pain management, such as low back pain, osteoarthritis, and total knee replacement (Barrington, Lovald, Ong, Watson, & Emerson, 2016; Lisowska, Siewruk, & Lisowski, 2016).

In our study, pain intensity and pain location were the most concerned aspects, whereas pain quality, pain duration, and the effect on functional exercises were the least evaluated aspects in the respondents' daily practice. Although most of the level 3 hospital nurses assessed patient pain intensity and quality, only about half of the level 2 hospital nurses did so, and the differences between the percentages were significant. Nurses in both level 2 and level 3 hospitals evaluated most patients' pain location, which is consistent with the conclusion of Ying Ge et al. (2013) that Chinese nurses are more likely to consider the location of pain but ignore other aspects of pain, such as intensity, quality characteristics, psychosocial relation, and effect. This ignorance of pain intensity and quality might be because Chinese nurses considered pain assessment as a tool to detect the progression of diseases rather

than systematic evaluation. For instance, compartment syndrome, caused by a long-lasting compression of plaster cast, is always accompanied by severe pain and needs immediate treatment. Nurses are usually more interested in using pain assessment tools to detect the appearance of complications such as compartment syndrome rather than evaluating the patients' pain to provide them with comfort or treatment.

Notably, although the benefits of functional exercise after orthopedic surgery have been recognized by the previous study (Minns Lowe, Barker, Dewey, & Sackley, 2007), only approximately half of the nurses evaluated whether pain influenced patients' functional exercises. Additionally, 59.09% level 3 hospital nurses and 38.46% level 2 hospital nurses were aware of the significance of evaluation of pain with activities, which affects postoperative rehabilitation and normal functions (Chou et al., 2016). Therefore, evaluation for functional exercise needs to be emphasized postoperatively to aid recovery.

Although there was no significant difference in treatment methods between level 2 and 3 hospitals, fewer patients received timely pain treatment in level 2 hospitals. This could be because less attention was given to pain treatment in level 2 hospitals. Without timely pain treatment, both the physiologic and psychological conditions of the patient will be affected (Dunwoody, Krenzischek, Pasero, Rathmell, & Polomano, 2008), for instance, by producing acute neurohumoral changes, long-lasting psychological and emotional distress, and chronic pain states (Beesdo et al., 2010; Dunwoody et al., 2008; McWilliams, Goodwin, & Cox, 2004). A safe, effective, patient-centered, timely, efficient, and

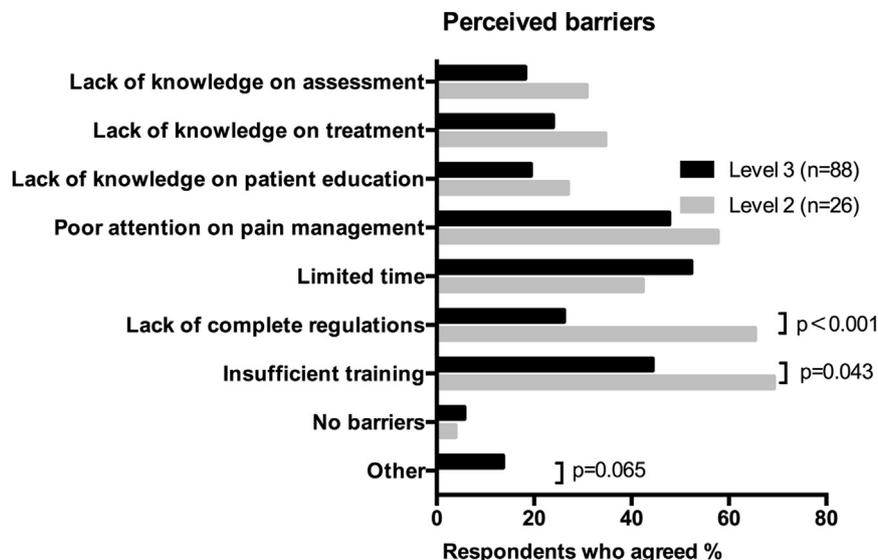


Figure 3. Perceived barriers during pain management practice. The perceived barriers to pain management are based on nurses' subjective judgments during clinical practice. A p value < .05 indicates significant differences between level 3 and level 2 hospitals.

equitable pain management method is thus urgently required (Institute of Medicine, 2011).

The Joint Commission on Accreditation of Healthcare Organizations recommends pain education for the patient and family members as part of clinical work (Bines & Paice, 2005); however, our survey revealed that only half of the nurses educated inpatients about the correct concept of pain treatment in level 2 hospitals; level 2 and level 3 hospitals differed significantly in this respect. This could be because the strict standards for level 3 comprehensive hospitals require that patients be educated to a greater extent, irrespective of whether they are inpatients or outpatients. Level 2 hospital nurses do not focus sufficiently on the inpatients and instead focus more on the analgesic agents. Previous studies have found that preoperative pain management education reduced pain, pain medication side effects, and recovery time (O'Donnell, 2015). Self-management of pain should be emphasized to promote pain self-prevention and self-assessment and should be performed in collaboration with pain specialists for pain treatment (Institute of Medicine, 2016). In addition to postoperative education, preoperative education on surgery may promote patients' self-care compliance and further improve their recovery (Cho & Chang, 2012; Fredericks, Guruge, Sidani, & Wan, 2010). As patient education is essential for effective pain management (Bozimowski, 2012), Chinese nurses in lower-level hospitals should focus more on pain management education to achieve better quality of prognosis (O'Donnell, 2015; Schug, Palmer, Scott, Halliwell, & Trinca, 2016).

To determine why level 3 hospital nurses performed better than those in level 2 hospitals, including the evaluation, treatment, and education of patients, we further compared the differences in training experiences, pain management policies, and the perceived barriers.

Although the majority of the nurses had received continuing education on pain management in our study (86.8%), nurses from level 2 hospitals had fewer chances to participate in relevant education programs ($p < .05$). Furthermore, level 3 hospital nurses reported a higher score for training methods and received more hospital or department training. Although the contents and frequencies of training were not reported in the present study, our results revealed that nurses from higher-level hospitals may receive more training and education about pain management. Similarly, level 2 hospital nurses were more likely to experience a "lack of training on pain management." Continuing education in pain assessment has a positive relationship with pain knowledge and treatment attitudes in both Western countries and China (Lin, Chiang, Chiang, & Chen, 2008) because continuing education might provide health professionals with essential knowledge. Therefore, without adequate training, Chinese level 2 hospital nurses may lack the knowledge of and skills for pain assessment and management and may not understand the importance of pain management. To bridge the gap in knowledge about pain management, it is important to encourage lower-level hospitals to provide financial support for nurses to attend continuing education programs on pain management (Ying Ge et al., 2013). Moreover, undergraduate and graduate training should offer normative information and training on pain management. For care providers, licensure, certification, and recertification should be included in the assessment of pain education, especially for nurses (Institute of Medicine, 2016).

Furthermore, there were large gaps in pain management regulations and policies between level 2 and level 3 hospitals. Our study found that less than one-fourth of the level 2 hospital nurses reported participation in the Painless Orthopedics Ward program and only about one-third reported establishment of policies for pain management, which were significantly lower than that in level 3 hospitals. Similarly, the "lack of regulations of pain management" was one of the most perceived barriers recognized by level 2

hospital nurses, possibly because the implementation details of the three-level hospital accreditation standards have emphasized the importance of pain management in level 3 hospitals (Chinese Hospital Association, 2011), with few standards focused on pain management in level 2 hospitals. Additionally, Ying Ge, et al. (2013) found that none of the surveyed nurses confirmed any policy about pain assessment among the Chinese hospitals. Moreover, in Canada only 16% nurses reported the absence of policies, procedures, or guidelines for pain assessment and management, indicating a large gap in the establishment of pain management regulations between China and Western countries (RNAO, 2013). The Registered Nurses' Association of Ontario recommends that all organizations establish related standards, policies, and procedures to assess and manage pain effectively (RNAO, 2013). Without the development of policies or procedures for pain management, health care professionals might neglect their responsibility of providing pharmacologic and nonpharmacologic comfort measures to help prevent or reduce patient pain (Czarnecki et al., 2011). Therefore continuing education, standards, policies, and procedures regarding pain management were insufficient in hospitals from China, especially level 2 hospitals. Great efforts should be made to help establish education programs, standards, and regulations to improve nurses' performance.

Implications for Nursing Education, Practice and Research

Hospitals in China are grouped into three levels (Meng, Yang, & Chen, 2015). Higher-level hospitals have higher levels of clinical staffing, more advanced equipment, and higher quality of medical care than lower-level hospitals (Gong, 2014; Süßmuth-Dyckerhoff & Wang, 2010). Patients in level 3 hospitals receive specialized health services, especially those with complicated diseases. A previous study revealed that patients in level 3 hospitals were more likely to receive recommended treatment compared with those in lower-level hospitals (Bi et al., 2009), but the pain management practices in different levels of hospitals remain unknown. Our results indicated that nurses from level 3 hospitals performed better pain management than those in level 2 hospitals. Furthermore, level 3 hospitals have established more regulations and policies of pain management and provided nurses more training about this issue. These results implied that hospital level might be an important factor of education, training, and pain management practice of nurses.

To improve pain management and bridge the gap between level 2 and 3 hospitals, a comprehensive education system is urgently needed. First, undergraduate education should offer normative information and training on pain management (Pizzo, 2011; Simon, 2011; Taylor & Stanbury, 2009). The collaborations between universities and hospitals can provide clinical scenarios for demonstrating pain management theories and improve evidenced-based pain management education, which may enhance undergraduate nursing education quality (Abdalahim, Majali, Stomberg, & Bergbom, 2011; Bergman, 2012). Second, care providers should be provided with more training and continuing education on this issue. Hospitals may collaborate with universities to design high-quality continuing education program and establish regulations and pathways for pain management based on guidelines, literature, and clinical experiences (Abdalahim et al., 2011; Schreiber, et al., 2014; Tse & Ho, 2014). Universities can perform evaluation for nurses' practice after education program or training so that they can monitor the efficiency and make improvements. Third, continuing education in the workplace is also important to improve the individual and organizational performances (Manley, Titchen, & Hardy, 2010; Williams, 2010). Goal-directed pain practice curriculum in the workplace may provide a clear and progressive

pathway for learning (Billett, 2016; Hicks, Bagg, Doyle, & Young, 2007). A positive learning culture should be developed to encourage both educators and learning nurses to participate in workplace learning of pain management (Eraut, 2007; Manley et al., 2010; Smedley & Morey, 2010; Williams, 2010). Fourth, administrators of hospitals and orthopedics wards should notice that nurses from level 2 hospitals may be more in need of training and education programs and make more efforts to improve nurses' performance in pain management.

It should be noted that the participants in our study were all female, and our results may not be applicable elsewhere. Previous studies have found that health care professionals were more likely to perform pain evaluation or treatment in same-gender patients (Chur-Hansen, 2002; Leresche, 2011; Safdar et al., 2009; Weisse, Sorum, & Dominguez, 2003). A possible reason may be that patients preferred and communicated better with same-gender nurses (Chur-Hansen, 2002; Noordman & van Dulmen, 2016). Gender differences in pain may be another reason. Higher pain prevalence was reported in female patients than in male patients (Greenspan et al., 2007; Leresche, 2011; Miaskowski, 2004). Moreover, male patients were more satisfied with the nursing care than were female patients (Findik, Unsar, & Sut, 2010), which may lead to underdiagnosis and undertreatments of male patients' pain. Therefore severity of patient pain rather than gender stereotyping should be the focus of pain management (Raftery, Smith-Coggins, & Chen, 1995).

Study Limitations

Despite our findings, our study had some limitations. First, the respondents were recruited from a conference, and the sample size was small. In the future, larger-scale investigations are required to confirm these conclusions. Second, the survey content may not have been sufficiently comprehensive, and the applications of the pain assessment tool and methods of nonpharmaceuticals analgesia could be included in future studies. Third, because our study was cross-sectional, the relationship between hospital level and nurses' pain management practice needs to be confirmed through a prospective study. Fourth, the participants in our study were all female, and our results may not be applicable to male nurses. Future studies are needed to explore whether there are gender differences in pain management practice in China. Finally, although this study revealed that nurses from level 3 and level 2 hospitals differed in methods of education, we still need to explore whether the contents or frequencies of education differed among nurses from different level hospitals in future studies.

Conclusions

In summary, nurses from level 2 hospitals receive less education on pain management, paid less attention to pain, and faced more restrictions in pain management compared with nurses from level 3 hospitals. Our study found that hospital level might be an important organizational factor of nurses' pain education, training, and practice. To manage pain effectively, hospitals and orthopedics wards should provide more training to help their nurses to increase knowledge on pain management. A close collaboration between universities and hospitals may be a good measure to improve pain management practice. Universities can not only guide the designation of continuing education program and establishment of clinical pathway and regulation but also improve their regular education from these collaborations. Finally, medical staff should be attentive to pain in patients and participate in pain management education programs. Only with the joint efforts of medical staff,

hospitals, and universities can we relieve patients' pain and improve our medical care.

Supplementary Data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.pmn.2018.08.002>.

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