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The relationship between hospital work environment and nurse outcomes in Guangdong, China: a nurse questionnaire survey

Ke Liu, PhD, RN [Associate Professor],
School of Nursing, Sun Yat-sen University

Li-Ming You, MSN, RN [Professor],
School of Nursing, Sun Yat-sen University

Shao-Xian Chen, MD, PhD [Candidate and Professor],
School of Public Health, Sun Yat-sen University

Yuan-Tao Hao, PhD [Professor],
School of Public Health, Sun Yat-sen University

Xiao-Wen Zhu, BSN, RN, PhD [Candidate],
School of Nursing, Sun Yat-sen University

Li-Feng Zhang, MSN, RN [Lecturer], and
School of Nursing, Sun Yat-sen University, Guangzhou, China

Linda H Aiken, PhD, RN [Professor]
Center for Health Outcomes and Policy Research, University of Pennsylvania, Philadelphia, PA, USA

Abstract

Aims and objectives—This study examines the relationship between hospital work environments and job satisfaction, job-related burnout and intention to leave among nurses in Guangdong province, China.

Background—The nursing shortage is an urgent global problem and also of concern in China. Studies in Western countries have shown that better work environments are associated with higher nurse satisfaction and lower burnout, thereby improving retention and lowering turnover rates. However, there is little research on the relationship between nurse work environments and nurse outcomes in China.

Design—This is a cross-sectional study. Survey data were collected from 1104 bedside nurses in 89 medical, surgical and intensive care units in 21 hospitals across the Guangdong province in China.

Methods—Stratified convenience sampling was used to select hospitals, and systematic sampling was used to select units. All staff nurses working on participating units were surveyed. The China Hospital Nurse Survey, including the Practice Environment Scale of the Nursing Work Index and

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Correspondence: Li-Ming You, Professor, School of Nursing, Sun Yat-sen University, 74 Zhongshan 2nd Road, Guangzhou 510089, China. Telephone: +86 20 87331727., youlm@mail.sysu.edu.cn.

Contributions
Study design: LY, SC, YH, LA; data collection and analysis: KL, XZ, LZ, YH, SC and manuscript preparation: KL, LY, LA.

Conflict of interest
There were no conflicts of interest.

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Maslach Burnout Inventory, was employed to collect data from nurses. Statistical significance level was set at 0·05.

Results—Thirty-seven per cent of the nurses experienced high burnout, and 54% were dissatisfied with their jobs. Improving nurses' work environments from poor to better was associated with a 50% decrease in job dissatisfaction and a 33% decrease in job-related burnout among nurses.

Conclusion—Burnout and job dissatisfaction are high among hospital nurses in Guangdong province, China. Better work environments for nurses were associated with decreased job dissatisfaction and job-related burnout, which may successfully address the nursing shortage in China.

Relevance to clinical practice—The findings of this study indicate that improving work environments is essential to deal with the nursing shortage; the findings provide motivation for nurse managers and policy makers to improve work environments of hospital nurses in China.

Keywords

burnout; job satisfaction; nursing; retention; work environment

Introduction

The nursing shortage is a global problem and also a severe problem in China (Aiken *et al.* 2001, Guo 2008, Kalisch & Liu 2009). The Chinese government recently announced a health reform agenda that places a priority on improving care in public hospitals (Chen 2009). Thus, it is imperative to have evidence on which to base recommendations for how nursing can help contribute to better hospital performance. Repeated studies, largely in Western countries, have indicated that hospital work environments were associated with nurse and patient outcomes and thus could be a solution for the nursing shortage and improved care quality (Aiken *et al.* 2002, 2008, Vahey *et al.* 2004). However, studies about hospital work environments are limited in China. This study aims to examine the relationship between work environments and nurse outcomes in hospitals in Guangdong province, China, with the goal of identifying promising strategies for addressing the nursing shortage in China.

Background

China has the largest population of any country in the world with a population of 1·3 billion including 167 million people over the age of 60 (Ministry of Civil Affairs of China 2010). Rapid economic development in China has spurred increased demand for health care (Blumenthal & Hsiao 2005). Hospitals are facing serious challenges to providing high quality of care in a rapidly changing environment. From 2002–2005, the number of hospitalised patients and total healthcare costs increased significantly and steadily in China (Ministry of Health of China 2006a).

The nursing shortage and staffing problems

While patients' needs and nurses' workloads have been increasing, nurse staffing has not increased at the same pace. In 2006, the Ministry of Health of China surveyed more than 400 Level 3 hospitals (hospitals with the most complex patients and technology) and found that the average nurse-to- bed ratio was only 0·33:1. Hospitals have not invested in increasing the number of nurse positions to improve nurse-to- bed ratios, and many hospitals increasingly turn to employing 'contract nurses' who are employed full time by the hospital

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but with lower salaries and without permanent jobs to decrease costs, resulting in severe nursing turnover (Ministry of Health of China 2006b).

China has a dual problem of too few budgeted positions for nurses in hospitals and too few nurses in the national nurse workforce for its large population. According to the Statistical Report of Healthcare Development 2010, the total number of registered nurses (RNs) in China was 2,024,000, at the end of 2010; the nurse-to-population ratio was 1·51 nurses per 1000 people, the nurse-to-physician ratio was 0·87:1 (that is, more doctors than nurses), and the nurse-to-bed ratio was 0·42:1 (Ministry of Health of China 2011). In many countries including the USA and Canada, the number of nurses is higher than nine nurses per 1000 people, the nurse-to-physician ratio is higher than 3:1, and nurse-to-bed ratio is about 3:1 (WHO 2010). The World Bank (1993) recommended a minimum ratio of nurse to population at two nurses per 1000 people and a nurse-to-physician ratio of between 2–4 nurses:1 physician. Given these recommendations, it is clear that China is experiencing an urgent nursing shortage.

Work environments and nurse outcomes

A growing body of research has documented an association between the quality of nurse work environments and nurse satisfaction and turnover, patient satisfaction and quality of care (Laschinger & Finegan 2005, Aiken *et al.* 2008, Friese *et al.* 2008). Data from an international sample of hospitals from Western countries indicated that nurses working in hospitals with poor environments were twice as likely to report dissatisfaction and higher burnout (Aiken *et al.* 2002). Atencio *et al.*'s (2003) study indicated that a positive work environment could improve job satisfaction, retain nurses and decrease turnover. Studies by Lynn and Redman (2005) and Kreitzer *et al.* (1997) also found that unhealthy work environments caused job dissatisfaction and burnout among nurses. According to an investigation among intensive care unit (ICU) nurses, Stone *et al.* (2007) concluded that creating a positive organisational climate could reduce intent to leave. In addition, Laschinger *et al.* (2009) investigated the impact of a professional practice environment on burnout among new graduates and obtained similar findings. Current studies in a variety of countries including those in Asia showed that work environments were associated with nurse job satisfaction, burnout and quality of care (Kanai-Pak *et al.* 2008, Chen & Johantgen 2010, Kwak *et al.* 2010).

Certain components of positive work environments have also been linked to better nurse outcomes. A meta-analysis study (Zangaro & Soeken 2007) identified that positive nurse–physician collaboration and autonomy were related to nurse job satisfaction, opportunities for personal growth and promotion. A study by Porter *et al.* (2010) indicated that identifying a partnership between nursing management and nurses at the bedside to jointly improve the work environment had positive effects on nurse turnover and job satisfaction. An internet survey indicated that support from colleagues could reduce job-related stress and nurses who received more support could perform better at their jobs (AbuAlRub 2004).

Based on a set of studies on Magnet hospitals and hospital restructuring, Aiken and her colleagues developed a conceptual framework for a supportive work environment (Aiken *et al.* 1997a,b). In their framework, nurse work environments could affect not only nurse outcomes, such as job satisfaction and work-related burnout, but also patient outcomes, such as patient satisfaction, mortality and failure to rescue. A subsequent body of research indicated that work environments were associated with patient outcomes such as 30-day mortality (Estabrooks *et al.* 2005, Tourangeau *et al.* 2007), patient satisfaction (Bacon & Mark 2009), nurse-assessed adverse events (Laschinger & Leiter 2006) and the incidence of infections (Stone *et al.* 2004).

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Although these studies provide strong empirical evidence of the importance of adequate staffing and good nurse work environments in Western countries, few studies have focused on the effects of work environments on nurse outcomes in China. There are some studies, however, that have focused on job satisfaction, work-related stress and burnout among nurses in China. One study conducted in China and South Korea comparing organisational characteristics of hospitals found that organisational factors were associated with job satisfaction and turnover among nurses (Piao & Piao 2005). Zuo (2006) suggested that the work environment characteristics that affected quality of life of nurses included the hospital size and the unit characteristics. Another study surveyed work environments of 208 nurses in a county hospital with a questionnaire that queried resources, cooperation and personal development domains (Liu *et al.* 2007). These limited studies cannot give a clear understanding about nurse work environments in China or the effects on nurse outcomes.

A national survey was therefore designed to investigate the working conditions of hospital nurses. It offers one of the few detailed analyses of the hospital nurse work environments in China. This paper reports the research findings in Guangdong province with the aim of examining the relationship between work environments and nurse outcomes.

Methods

This is a cross-sectional study conducted in Guangdong province in mainland China.

Target population and eligibility criteria

For the purposes of this study, nurses are defined as: (1) holding a secondary diploma or further educational qualifications in nursing (a secondary diploma is the minimum qualification for practice as a registered nurse in China) and (2) providing bedside patient care in hospitals. The target population of the survey was nurses working on adult general and specialty medical and surgical units and adult ICUs in Level 2 general hospitals with 300–500 beds and all Level 3 general hospitals (>500 beds) in Guangdong province. All staff nurses working on those units in the participating hospitals were considered to be eligible for the survey, and nurse managers were excluded from the survey.

Hospital and nurse sampling

Stratified convenience sampling was used to select hospitals. A list of hospitals was obtained from Department of Health of Guangdong province. Hospitals were stratified based on: (1) Level: Level 2 and Level 3; (2) Location: in the capital city or in other cities of Guangdong province and (3) Ownership/ affiliation. Twenty-one out of 196 hospitals were sampled from Guangdong province. The study hospitals were drawn from 11 different cities/ counties in Guangdong province. Ninety-five per cent of hospitals invited agreed to participate.

The total number of nurses employed in each of the 21 hospitals ranged from 76–1028; the number of adult general and specialty medical and surgical units and adult ICUs ranged from 5–51; and 77·3% of nurses in participating hospitals worked on these units. These units were therefore considered to represent a major proportion of total clinical nurses in the hospitals. A list of all eligible units in each hospital was obtained, and by systematic random sampling, at least four units were selected in each hospital. Finally, 89 units were sampled from the 21 participating hospitals. All staff nurses working in these units were surveyed by cluster sampling. From each hospital, 50–75 nurses were sampled, ranging from 6·5–51·4% of the total number of nurses in the hospitals. Finally, 1208 questionnaires were delivered, 1153 (95·45%) of nurses returned the questionnaires, and 1104 (91·39%) questionnaires were valid. These 1104 nurses represented 17·1% of all nurses in the participating hospitals.

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Instruments

The China Hospital Nurse Survey was modified from an instrument developed for use in the USA by the Center for Health Outcomes and Policy Research at the University of Pennsylvania School of Nursing. The questionnaire was translated into Chinese and back-translated into English by different bilingual nurse researchers. Translation versions were compared with the original instrument to ensure the precision of the translation. Linguistic translation and cultural translation evolved in this process. Items that were not suitable to the Chinese cultural context or healthcare system were modified or deleted. The survey was used to collect data on nurse demographics, hospital work environments, job satisfaction and burnout and intention to leave. The nurse work environment was measured by the Practice Environment Scale of the Nursing Work Index (PES-NWI) (Lake 2002). The PES-NWI is composed of five subscales and 31 items. Each item was scored from 1 (for 'strongly disagree')–4 (for 'strongly agree'). To analyse the work environments at the unit level, the subscale means of each nurse were aggregated to the unit level. Following the aggregation method in Aiken *et al.* (2008), unit-level medians for each subscale for the 89 units from the 21 hospitals were computed, and each unit was coded as below the median and at or above the median for each subscale. Units that were above the median on four or five subscales were classified as 'good', those with two or three subscales above the median were classified as 'mixed', and units with only one or no subscales above the median were classified as 'poor' environments. Nurse job satisfaction was measured by a single question with four response categories, and nurse burnout was measured by the emotional exhaustion subscale (nine items) of the Maslach Burnout Inventory (MBI). Scores of 27 or greater were considered indicative of high burnout (Aiken *et al.* 2008). Intension to leave was measured by a single dichotomous response item that asked nurses whether they had any plans to leave their present employer in the next year.

Focus group techniques were employed to establish content validity and assess cultural relevance of the instrument. The focus group included 10 nurses from eight hospitals across Guangzhou city. Reliability of the PES-NWI was calculated by Cronbach's alpha with data from a pilot study. The pilot study surveyed 50 nurses at one university hospital. The Cronbach's alpha was 0·93 for the PES-NWI.

Data collection

The data were collected between October–December 2008. The nursing departments of participating hospitals were approached to invite participation. Only one hospital refused the survey citing insufficient staff assistance. The nursing director in each study hospital facilitated the implementation of the survey and designated a research nurse to work with the study director from Sun Yat-sen University School of Nursing. The research nurses in each hospital were trained before data collection. The training included the research goals, sampling methods and correct delivery and returning process for the questionnaires. The China Hospital Nurse Survey was delivered to the sampled units by the study director and the research nurse and then delivered by the nurse manager to nurses who met the eligibility criteria on these units. The nurses completed the questionnaires anonymously and returned them in a sealed envelope to a sealed box on the unit. These strategies endeavoured to protect the privacy of nurses and increase the response rate. Subsequently, the nurse manager returned the sealed questionnaires to the research nurse, who returned all sealed questionnaires to the study director from the university.

Ethical considerations

The research project was approved by Ethical Committee of School of Nursing, Sun Yat-sen University. Informed consent was obtained from each hospital and each sampled nurse.

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Data analysis

Data were analysed using SPSS software (version 16.0; SPSS Inc., Chicago, IL, USA). Frequency, percentage, mean, SD and median were used to describe nurse characteristics, work environments and nurse outcomes. The chi-square test, Mann–Whitney *U*-test, Spearman's correlation and logistic regression were used to examine the relationships among nurse characteristics, hospital characteristics, work environments and nurse outcomes. Two-tailed tests of mean differences were used throughout, and the 0·05 level was used as the criterion for determining statistical significance.

Results

Nurse characteristics

In our sample, as shown in Table 1, 47·7% of the participating nurses worked in Level 2 hospitals, and 52·3% nurses worked in Level 3 hospitals. Sixty-four per cent of participating nurses worked in Guangzhou, the capital city of the province and 36·1% worked in other cities. Almost all of the nurses (97·8%) were female. The age range of the sample was 18–55 (28·55 SD 6·17) years old, and most of them were married (51·6%), <30 years old (62·7%) had no young children (57·5%) and most held an advanced diploma (64·6%). Compared with the overall nurse population in China (Ministry of Health of China 2009, 2011), the nurses in our sample were younger, and their educational levels were higher. Almost 20% of nurse respondents had a baccalaureate degree when only 8·8% of Chinese nurses nationally have a baccalaureate. The probable explanation for the differences in our sample and the national nurse workforce is that the nurses we surveyed were front-line clinical nurses in Level 2 and Level 3 hospitals. Younger nurses often hold these positions. In terms of educational levels, older nurses often have less education because of the delayed development of higher nursing education in China.

Among our sample, 57% of the nurses were contract nurses and 43% held permanent positions. On average, nurse respondents had worked for 7·89 (SD 6·87) years as a nurse. In these 21 hospitals, the nurse-to-physician ratio was 1·4:1 on average.

Work environments

Nurse work environments were measured using the PES-NWI and were aggregated to the unit level. The means and medians for the five subscales and the categories of units are shown in Table 2.

The findings showed that the median and mean scores were >3·00 on three subscales, which were 'Nursing Foundations for Quality of Care' (3·18; 3·19 SD 0·26), 'Nurse Manager Ability, Leadership and Support' (3·18; 3·13 SD 0·34) and 'Collegial Nurse-Physician Relations' (3·40; 3·36 SD 0·31). However, the scores for 'Staffing and Resource Adequacy' (2·92; 2·89 SD 0·38) and 'Nurse Participation in Hospital Affairs' (2·98; 2·94 SD 0·37) were slightly lower than 3·00. Of the 89 units, 39 units (43·8%) were classified as poor environments, while 40 units (45%) were classified as good environments according to Aiken's aggregation method (Aiken *et al.* 2008).

Analysis using the chi-square test examined differences in work environments among hospitals with different characteristics, that is, hospital level, technology complexity and locations. Hospitals that could conduct open-heart surgery or major organ transplant were categorised as high-technology hospitals and those could not conduct either of the above operations were categorised as low-technology hospitals. However, the findings showed that there were no significant differences in work environments among hospitals at different

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levels (χ^2 = 0·747, p = 0·820), technology complexity (χ^2 = 1·264, p = 0·675) or locations (χ^2 = 0·677, p = 0·270).

The chi-square test, Mann–Whitney *U*-test and Spearman correlation were used to examine the differences in work environments among nurses in different groups according to gender, age, marital status, having children younger than 18 years old or not, employment status, working years and education level. In different hospital environments, there were no significant differences among nurses with different gender (Z = 0·254, p = 0·800), marital status (χ^2 = 3·353, p = 0·187) or employment status (Z = −1·097, p = 0·273). However, age (χ^2 = 10·788, p = 0·005), working years (χ^2 = 16·726, p < 0·001), having younger children or not (Z = −23·76, p < 0·001) and educational level (χ^2 = 22·278, p < 0·001) were factors significantly associated with hospital work environments. All of these factors were controlled for when we predicted the relationship between work environments and nurse outcomes.

Nurse outcomes

More than half of the nurses (54%) were dissatisfied with their jobs. Using the MBI, scores 27 or greater were considered indicative of high burnout (Aiken *et al.* 2008). Thirty-seven per cent of nurses reported a high level of burnout, and 7·5% of them intended to leave their current employer in the next year. About 9·9% of the younger nurses (under 30 years old) intended to leave (Table 3). Further analysis compared differences in nurse outcomes among nurses with different characteristics. Permanent nurses experienced more severe job dissatisfaction and burnout than contract nurses. Nurses who had worked more than one year were more dissatisfied with their job and suffered significantly more severe burnout (p < 0·05) than those who had worked less than one year. Contract nurses and nurses younger than 30 years old were more likely to leave their job (p < 0·001) than permanent nurses and those aged 30 years and over (Table 3).

Effects of work environments on nurse outcomes

In the logistic regression analysis, job satisfaction and burnout were calculated as dichotomous variables. That is, ‘very satisfied’ and ‘somewhat satisfied’ were combined as ‘satisfied’ and ‘very dissatisfied’ and ‘somewhat dissatisfied’ were combined as ‘dissatisfied.’ For the MBI, scores 27 and above were calculated as high burnout. Nurse characteristics (such as age, educational level, marital status, etc.) were controlled for in the regression models. The odds ratios (OR) implied that in fully adjusted models, the likelihoods of having higher burnout and job dissatisfaction were lower in units with good environments than in units with poor environments, by OR of 0·67 and 0·50, respectively. The odds of nurse being burned out and being dissatisfied with their jobs were lowered by 33% [i.e. (1–0·67) × 100] and 50% [i.e. (1−0·50) × 100] in units with good environments compared with the nurses in units with poor environments (Table 4). The reciprocals of these ratios implied that nurses in poor unit environments were 1·5 and two times more likely than their counterparts in good environments to exhibit burnout and job dissatisfaction.

Discussion

This study provides new evidence about the work environments of hospital nurses in China. The findings of this study indicated that nurses in nearly 40% of the surveyed units rated their work environments as poor, and nurses were dissatisfied with their job and suffered from high burnout. The study also found that better work environments were associated with positive nurse outcomes.

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Nurses were not satisfied with their level of participation in hospital affairs and were especially dissatisfied with inadequacies of staffing and resources in their work environments. Our findings suggest that nursing foundations for quality of care as well as support from nurse managers are lagging and must be improved if nurse outcomes are to be improved. In contrast with nurses in Canadian hospitals where nurses rated their relationships with physicians as the lowest subscale (Armstrong & Laschinger 2006), nurses in our study hospitals were more satisfied with nurse–physician relations than with other aspects of the work environment.

More nurses (54%) in our sample reported dissatisfaction with their job, as compared with 17·4–41·0% in other studies (Aiken *et al.* 2001, Kwak *et al.* 2010). The high rate of burnout reported by nurses in Guangdong province was similar to those in other studies (Aiken *et al.* 2001, Kwak *et al.* 2010) except Japan, where 60% nurses reported being dissatisfied with their jobs and 56% of nurses evidenced high burnout (Kanai-Pak *et al.* 2008). Several studies in China reported problems of burnout and job dissatisfaction among nurses, but these studies did not explore the relationship between burnout and job dissatisfaction and work environments (Zhang *et al.* 2005, Chao & Yao 2006, Xie *et al.* 2007, Zhen & Duan 2007, Zhao *et al.* 2009). Our study indicated that permanent nurses experienced more severe job dissatisfaction and high burnout, which is consistent with other studies in China (Xie *et al.* 2007, Zhao *et al.* 2009). One possible reason could be that permanent nurses are more senior than contract nurses, and they usually take on more job responsibilities than contract nurses. Our findings were consistent with several studies that found higher turnover rates among contract nurses (Han *et al.* 2007, Cheng *et al.* 2008, Guo 2008). Considering that more and more nurses are employed as contract nurses in hospitals in recent years, policy makers and managers should pay more attention to these phenomena.

In our survey, 7·5% of all nurses but 9·9% of younger nurses (<30 years old) planned to leave their current employers. This indicates that the retention problem is more severe among younger nurses. The rate of ‘intension to leave’ reported by nurse respondents in this survey was lower than the actual turnover rates that were reported in previous studies (Han *et al.* 2007, Cheng *et al.* 2008), indicating that our findings may understate the actual problem.

Consistent with international studies (Friese *et al.* 2008, Kanai-Pak *et al.* 2008, Chen & Johantgen 2010), our findings also indicated that better work environments were associated with better nurse outcomes (job-related burnout and job dissatisfaction). Aiken *et al.* (2008) conducted a study in England and found that implementation of the Magnet Hospital principles could improve job satisfaction of nurses and their appraisals of the quality of care. The findings of this study support the conclusion of the International Hospital Outcomes Study in Western countries (Aiken *et al.* 2001) and underscore the importance of managerial support for nurses in China’s hospitals.

As healthcare reform proceeds in China, the findings of this study provide valuable and meaningful evidence and suggestions for management and policy makers. First, adequate attention should be paid to the nursing shortage in China’s hospitals. The reform of China’s healthcare system will require hospital management to undertake strategies to improve quality of care, patient satisfaction and, at the same time, cost effectiveness. Nurses face increasingly stressful work environments in the hospitals. As shown in our findings, nurses experienced staffing shortages during their daily work, and these shortages contributed to dissatisfaction with their job and job-related burnout. The nurse-to-physician ratio was much lower than 2:1, the standard suggested by the World Bank (1993). This situation differs from other countries, and the major reason may be that hospital administrators favour hiring physicians over nurses because nursing interventions are not well reimbursed compared with

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medical interventions in China's payment system for medical services (Guo 2008). Furthermore, most clinical nurses were female and younger than 30 years old, half of them were married and 42·5% of them needed to take care of their children and balance job and family roles. Heavy workloads and unsatisfactory rates of pay cause nurses to leave (Zhang *et al.* 2005, Chao & Yao 2006).

Second, nurses should take more active roles in hospital affairs, and nursing management should provide more support to nurses. In China, county hospitals and higher-level hospitals have nursing departments headed by nursing directors, while smaller hospitals have chief nursing officers. The nursing managerial system should take more important roles and functions in hospital management (Yang 2007, The Central Government of China 2008) and focus on improving the nurse work environments. However, most nursing directors we worked with to arrange for the survey said they had little power in hospital policy, even in managing nurse staffing. The Chinese Nurses Association also suggested improving nurse work environments by enhancing nursing participation in hospital management (Wang 2007). Overall, nursing participation in management and decision-making is essential to improving nurse work environments.

Third, more support should be provided to contract nurses. According to the Nurse Regulation, contract nurses should have the same salaries and benefits as permanent nurses (The Central Government of China 2008). In many cases, however, their salaries and benefits are much lower than permanent nurses at the same hospital and unit (Qian 2005). Considering that more than half of the nurses we surveyed were contract nurses and that they were much more likely to leave their job, strategies for improving work environments for contract nurses, such as increasing payments and giving equal opportunities for career development, should be emphasised by hospital management.

In our study, although only 21 hospitals were surveyed, the stratified sampling provided a representative sample of hospitals in Guangdong province, and systematic sampling of units and cluster sampling of nurses decreased the sampling bias among units and nurses. Furthermore, the high response rates from hospitals and nurses suggested little selection or response bias. Our study used well-tested instruments with good psychometric properties. These instruments were carefully translated into Chinese following translation and back-translation procedures, and content validity studies were conducted to insure that the content was understandable in a Chinese nursing context. Evidence from this study could therefore be valuable to identifying the importance of the nursing work environments in China.

Limitations

We excluded smaller hospitals from our study, and these institutions should be included in future studies. We also did not survey nurses in units such as emergency, outpatient and paediatrics; their perceptions of their unit and hospital work environments should be studied in future.

Conclusion

Nursing work environments of hospitals in Guangdong province need to be improved. More than one half of nurses were dissatisfied with their jobs, and about one-third of nurses suffered high-level burnout. The reported 'intention to leave' was not at a high level, but may be understated. Improving work environments from poor to better holds promise for reducing nurses' job dissatisfaction and burnout. Action by management in hospitals to create positive work environments may be essential to reduce high nurse burnout and job dissatisfaction.

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Relevance to clinical practice

The findings of this study can help draw the attention of nursing managers and policy makers to the fact that China hospitals have a nursing shortage, that hospital nurses face severe problems in their work environments and that improving work environments is one essential strategy to improving nurse job satisfaction and reducing nurse turnover.

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Table 1

Characteristics of nurses (n = 1104)

	n (%)	Mean	SD
Hospital level			
Level 2	527 (47·7)		
Level 3	577 (52·3)		
Hospital location			
Capital city	705 (63·9)		
Other cities	399 (36·1)		
Gender			
Female	1078 (97·8)		
Male	24 (2·2)		
Age			
18–24	343 (31·4)	28·55	6·17
25–29	341 (31·3)		
30–34	212 (19·4)		
35–39	126 (11·6)		
40–55	69 (6·3)		
Marital status			
Single	491 (47·2)		
Married	537 (51·6)		
Children under 18 years			
No	599 (57·5)		
Yes	442 (42·5)		
Working years			
<1 year	132 (12)	7·89	6·87
≥1 year	964 (88)		
The highest education in nursing			
Secondary diploma	168 (15·3)		
Advanced diploma	709 (64·6)		
Baccalaureate degree	217 (19·8)		
Master's degree	4 (0·4)		
Employment status *			
Contract nurses	590 (57·4)		
Permanent nurses	437 (42·6)		

* Contract nurses mean nurses full time employed by the hospital but without permanent contract with hospitals.

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Table 2

Work environments among units (n = 89)

Variables	Min.–max.*	Median†	Mean ± SD	*n* (%)
PES-NWI subscale scores				
Nurse participation in hospital affairs	2·18–3·93	2·98	2·94 ± 0·37	
Nursing foundations for quality of care	2·45–3·95	3·18	3·19 ± 0·26	
Nurse manager ability, leadership and support	2·20–3·80	3·18	3·13 ± 0·34	
Staffing and resource adequacy	2·08–3·77	2·92	2·89 ± 0·38	
Collegial nurse–physician relations	2·45–4·00	3·40	3·36 ± 0·31	
Categorised work environments‡				
Good				40 (44·94)
Mixed				10 (11·24)
Poor				39 (43·82)

*Reported were means of each subscale.

†To analyse the work environments at the unit level, the subscale means of each nurse were aggregated to the unit level. Then, unit-level medians for the 89 units were computed for each subscale.

‡Each unit was coded as below the median or at or above the median for each subscale. Units that were above the median on four or five subscales were classified as ‘good’, those with two or three subscales above the median were classified as ‘mixed’, and units with only one or no subscales above the median were classified as ‘poor’ environments, respectively.

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Table 3

Nurse outcomes among nurses with different characteristics (n = 1104)

	Nurse outcomes								
	Job dissatisfaction			High burnout*			Retention†		
Characteristics	***n* (%)**	***F***	***p*-value**	***n* (%)**	***F***	***p*-value**	***n* (%)**	***F***	***p*-value**
Employment status									
Contract nurses	294 (49·9)	7·983	0·005	197 (33·8)	6·8	0·01	61 (10·7)	16·682	<0·001
Permanent nurses	257 (58·8)			179 (41·7)			16 (3·7)		
Working years									
<1 year	48 (36·4)	18·535	<0·001	36 (27·5)	5·1	0·015	10 (7·7)	0·003	0·958
≥1 year	542 (56·3)			342 (38·5)			71 (7·6)		
Age									
<30	368 (53·8)	0·041	0·840	234 (36·9)	0·134	0·714	66 (9·9)	14·668	<0·001
≥30	221 (54·4)			145 (38·1)			14 (3·5)		
Total	590 (54·0)			379 (37·3)			81 (7·5)		

*Scores 27 or greater on the emotional exhaustion subscale (nine items) of the Maslach Burnout Inventory (MBI) were defined as high burnout.

†Intention to leave the current employer in the following year.

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Table 4

Adjusted odds ratios estimating the effects of work environments on nurse outcomes

	Burnout	Job dissatisfaction	Retention
Unit work environment			
OR	0·673	0·501	0·599
95%CI	0·508–0·893	0·379–0·664	0·357–1·007
p-value	0·006 *	<0·001 *	0·053

Adjusted variables included gender, age, marital status, having children younger than 18 years old or not, registered or not, employment status, working years and education level.

* $p < 0{\cdot}01$.