

ORIGINAL ARTICLE

Relationship between sub-health and occupational stress among operating theatre nurses in China: A questionnaire survey

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ABSTRACT

Background: Studies on sub-health status in general community populations are common, but there is a dearth of research on sub-health of operating theatre nurses in China. This study is to explore the relationship between sub-health and occupational stress among operating theatre nurses.

Methods: A cross-sectional questionnaire study was conducted in an operating centre in China in December 2007 among 70 operating theatre nurses. Measures: Nurse occupational stressor scale and the diagnostic criterion of sub-health were used. Percentile, t-test and regression were employed for statistical analysis.

Results: Nurses reported high stress levels in workload and time pressure subscale, followed by professional and career issues, patient care and interaction, interpersonal relationships and management issues, resource and environmental problems. Fifty subjects (76.9%) suffered from one or more sub-health symptoms. Fatigue was the most common symptom. Occupational stress was positively correlated with age, duration of work in OT, designation, and attending continuing education. Female nurses experienced more stress in workload and time pressure. The occupational stress experienced by sub-health nurses was higher than healthy ones.

Conclusion: The operating theatre nurses in our study experienced higher occupational stress and most of them were suffering from sub-health. Occupational stress was related to sub-health status.

Keywords: Occupational health; Stress; Operating Theatre Nurse; Sub-health.

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Background and Research Questions:

'Sub-health condition', also known as the 'Third State', is a grey area between health and disease. It refers to the health condition of a person who has no clinical symptoms but has a tendency to suffer from potential diseases, or has symptoms but without evidences of clinical examination. Sub-health condition is an urban disease of low quality and imbalanced psychological status where the body structure becomes reduced and the physiological function is declined (Hu et al., 2012).

In recent years, sub-health has been topical in health care. Some people often experience malaise and have symptoms of dizziness, headache, chest tightness, palpitation, shortness of breath, depression, etc. According to a global survey conducted by World Health Organization (WHO), about 75% of the world population was in sub-health condition (cited in Yan et al., 2005). According to Shanghai International Medicine Communication Center's 1998 survey, 72.8% of the Chinese population was in sub-health status (Zhou et al., 2002).

Occupational stress is 'the harmful physical and emotional responses that occur when the requirements of a job do not match the capabilities, resources, or needs of the workers' (cited in Hall, 2004). It is a result of combined exposure to several factors in the work environment and employment conditions, such as noise, extremes of temperature, polluted air and ergonomic factors (Gray-Toft & Anderson, 1985; Lewis & Robinson, 1992; Li & Liu, 2000; Li & Lambert, 2008). Sub-health is one of the possible consequences of chronic occupational stress (Freudenberger, 1974).

Nurses are considered to be particularly susceptible to sub-health. According to a few studies conducted in mainland China, the prevalence of sub-health ranged from 51.6% of all nurses (Huang & Tan, 2005) to 62.2% of ICU nurses (Liu & Guo, 2006) and 87.9% of emergency department nurses (Fu, 2007). The reason may be that nursing is considered to be inherently stressful (Schaefer & Moos, 1993; Decker, 1997). Work-related stressors associated with nursing include working under great pressure due to heavy workload, poor staffing, exposure to death and dying, and inter-staff conflict (Xianyu & Lambert, 2006), frustrated ideals in this area of care, noise pollution, lack of knowledge, insufficient social support, lack of resources, little train-

ing, excessive paperwork, and limited decision-making (Kelly & Cross, 1985; Topf & Dillon, 1988; Lewis & Robinson, 1992; Welker-Hood, 2006). The work of operating theater (OT) nurses is unique, as they provide continuity of care throughout the peri-operative period, using scientific and behavioural practices with the eventual goal of meeting the individual needs of patients undergoing operation. OT nurses face special noise, such as ventilation systems continued to function, metal instruments that produce loud noises if dropped, electric tools that produce very loud in bursts, frequent alarms on anaesthetic machines and so on (Stringer et al., 2008) and anaesthetic pollution (Oliveira, 2009). A study found that physical problems and miscarriage were quite common among female OT staff (Rosenberg & Kirves, 1973).

However, many of the current studies on occupational stress have been done in Western countries, and there are cultural differences between Western and Chinese countries that may influence occupational stress. As our literature search did not generate any studies examining the relationship between occupational stress and sub-health among OT nurses in China, therefore, we conducted this study.

Research Questions:

What is the sub-health condition among operating theatre nurses?

What is the occupational stress of operating theatre nurses in China?

What is the relationship between sub-health and occupational stress and the factors influencing occupational stress and sub-health?

Methods:

Design:

A cross-sectional questionnaire survey design was adopted and data were collected in December 2007.

Sample

We chose one of Beijing's acute-care teaching hospitals, which has 1300 beds, as the study site. The organizational structure and range of services of the study hospital are typical of other hospitals of similar

discipline and size in China. The study hospital has one operating center comprising 14 operating rooms (OR), with 12 OR for scheduled surgeries, 1 OR for emergency surgeries, and 1 OR for preparation and anesthesia recovery. On average, 100–130 operations are performed every weekday. All of the 70 OT nurses in this operating center were surveyed, and 65 of them returned completed questionnaires, yielding a response rate of 92.9%.

Measures

Nurse Occupational Stressor Scale

Occupational stress was assessed using the Nurse Occupational Stressor Scale developed by nursing experts from America, Thailand and China in 2000 (Li & Liu, 2000), and the scale was being used frequently in China at the time of this study. The scale consists of 35 items in 5 subscales: professional and career issues (PC) (7 items, e.g. “need to do shifts frequently”); workload and time pressure (WTP) (5 items, e.g. “workload is too heavy”); resource and environmental problems (REP) (3 items, e.g. “bad working environment”); patient care and interaction (PCIA) (11 items, e.g. “patient is not cooperative”); and interpersonal relationships and management issues (IPRM) (9 items, e.g. “conflict with physician”). All items are scored on a Likert scale ranging from 0 to 4 (0 = strongly disagree, 4 = strongly agree). Higher scores on the scale indicate higher levels of occupational stress. In the original scale, the Cronbach’s alpha coefficients of internal consistency of the scale was .95 for PC, .83 for WTP, .92 for REP, .94 for PCIA, .90 for IPRM, and for all items .98.

Diagnostic Criterion of Sub-Health with Delphi Method

The diagnostic criterion of sub-health was developed by Chen et al. (2003) according to research guidelines for the Delphi survey technique (Hasson et al., 2000), and was being used commonly in China at the time of study. The criterion consists of 18 items and 6 domains: physical symptoms (5 items, e.g. ‘fatigue’), psychological symptoms (6 items, e.g. ‘anxiety’), vigour (3 items, e.g. ‘lack of energy’), social adaptability (2 items, e.g. ‘difficulty in doing work’), immunity (1 item, ‘catch a cold or other diseases easily’), and serious sickness requiring treatment in the hospital (1 item, ‘need to see doctor’). According to the diagnostic criterion, the harmonious coefficients were statistically significant ($P < .05$). The weight coefficients were .27 (physical symptoms) .25 (psychological symptoms), .17 (vigour), .11

(social adaptability), .14 (immunity), and .10 (serious sickness requiring treatment in the hospital). Participants who had any one of these 18 symptoms lasting longer than 1 month in the year before the survey would be diagnosed as having a sub-health status.

Data Collection

The principle investigator (PI) briefed all nurses-in-charge about the purpose of the research. A locked collection box in the operating theater was provided for nurses to return their completed questionnaires with considering confidentiality and anonymous. One of the nurses-in-charge distributed questionnaires to all the nurses who were on duty, and she was also responsible for collecting the completed questionnaires and returning them to the PI.

Ethical Considerations

The study was approved by Peking University Health Science Center, Beijing, China. Permission to distribute the questionnaires was obtained from the hospital’s ethics committee.

Analytic Strategy

Data analyses were performed using SPSS (version 20.0). Continuous variables were presented as means and standard deviations (SD). Multiple linear regression analysis was used for the 5 subscales of occupational stress and demographic variables. The scores of the 5 subscales of occupational stress were designated as dependent variables and the demographic variables as independent variables. A two-tailed t-test was used to describe the difference of occupational stress between sub-healthy and healthy groups, and $P < 0.05$ was considered to be statistically significant.

Results

Validity and reliability of the instruments

The two instruments were considered to have content validity as they were developed following an extensive review of the literature and were designed to examine nurse occupational stress and sub-health status. And both of these two questionnaires were used frequently in China in the study time. The internal consistency coefficient Cronbach’s Alpha was used to test the reliability of these two instruments. For nurse occupational stressor scale, the Cronbach’s Alpha coefficient for professional and career issues was .76, workload and

time pressure .72, resource and environmental problems .75, patient care and interaction .88, interpersonal relationships and management issues .89, and entire questionnaire .95. For diagnostic criterion of sub-health criterion, the Cronbach's Alpha coefficient for physical symptoms was .76, psychological symptoms .87, vigour .80, social adaptability .78, and complete questionnaire .93. All Alpha coefficients are reaching the acceptable level of questionnaires (Kline, 1999; George & Mallery, 2003).

Demographic characteristics

The study participants ranged in age from 21 to 50 years, (mean 29.5 and SD 7.4). The median duration of employment in OT nursing was 9 years (range: 1–30), almost half of them worked in OT longer than 10 years

Table 1. The demographic characteristics of the sample (n=65)

Demographic Characteristics	Frequency	%
Gender		
Male	06	09.2
Female	59	90.8
Duration working as OT Nurse		
9 years or shorter	35	53.8
10 years or longer	30	46.2
Marital Status		
Single	35	53.8
Married	30	46.2
Educational level		
Advanced diploma or below	59	90.8
Bachelor degree	06	09.2
Designation		
SN# or EN\$	34	52.3
SSN† or above	31	47.7
Children in the family		
No	36	55.4
Yes	29	44.6
Working hours per week		
49 hours or less	16	24.6
50 hours or longer	49	75.4
OT sets per day		
4 sets or less	36	55.4
5 sets or more	29	44.6
Is attending continuing education		
No	22	33.8
Yes	43	66.2
Night shifts per month		
No	18	27.3
Yes	47	72.3

#SN = Staff Nurse, \$EN = enrolled Nurse; †SSN = Senior Staff Nurse

(Table 1).

Sub-health symptoms of OT nurses

Fifty nurses (76.9%) reported that they had one or more symptoms lasting longer than one month in previous year. Among all the symptoms, fatigue was the most common, followed by numbness of shoulder(s) or

Table 2. Symptoms of Sub-Health (n = 50)

Items	N	%
Physical symptoms (5 items)		
Fatigue	44	88.0
Numbness of shoulder(s) or leg(s)	26	52.0
Headache or dizziness	21	42.0
Pharyngeal foreign body sensation	15	30.0
Tinnitus	6	12.0
Psychological symptoms (6 items)		
Dreaminess or poor rest	21	42.0
Distracted or be upset	20	40.0
Poor memory	19	38.0
Anxiety	15	30.0
Loneliness	11	22.0
Difficulty concentrating	11	22.0
Vigour (3 items)		
Lack of energy	22	44.0
Bad mood	15	30.0
Not interested in things around	13	26.0
Social adaptability (2 items)		
Difficulty in doing work	13	26.0
Bad relationship with colleagues	7	14.0
Immunity (1 item)		
Catch a cold or other diseases easily	18	36.0
Serious sickness requiring treatment in the hospital (1 item)		
Need to see doctor	14	28.0

leg(s), lack of energy, headache or dizziness, dreaminess or poor rest, and distracted or upset (Table 2).

Occupational Stressors of OT nurses

Table 4. Multiple regression analysis (stepwise method) of occupational stress on split data of 'female without bachelor degree' (n = 53)

Dependent variables	R ²	Independent variables	b	S.E.	t-value	Significant level	
Professional and career issues (PC)	0.430 F = 12.328 P < 0.001	Constant	3.085	.133		23.214	.000
		Children (No/Yes)	.399	.100	.436	3.996	.000
		OT sets per day (4 or less/5 or more)	-.270	.101	-.292	-2.677	.010
		Night shifts (No/Yes)	-.328	.127	-.281	-2.572	.013
Workload and time pressure (WTP)	0.536 F = 13.847 P < 0.001	Constant	3.052	.148		20.627	.000
		Designation (SN [#] or EN [§] /SSN [†] or above)	.544	.103	.532	5.258	.000
		OT sets per day (4 or less/5 or more)	-.308	.105	-.298	-2.921	.005
		Night shifts (No/Yes)	-.317	.130	-.243	-2.443	.018
		Continuing education (No/Yes)	.261	.119	.220	2.200	.033
Resource and environmental problems (REP)	0.156 F = 9.459 P = 0.003	Constant	1.411	.371		3.804	.000
		Age (years)	.037	.012	.396	3.076	.003
Patient care and interaction (PCIA)	0.408 F = 11.265 P < 0.001	Constant	2.759	.154		17.966	.000
		Children (No/Yes)	.465	.115	.449	4.034	.000
		OT sets per day (4 or less/5 or more)	-.308	.117	-.294	-2.645	.011
		Night shifts (No/Yes)	-.302	.147	-.228	-2.050	.046
Interpersonal relationships and management issues (IPRM)	0.211 F = 13.675 P = 0.001	Constant	2.294	.095		24.177	.000
		Designation (SN [#] or EN [§] /SSN [†] or above)	.511	.138	.460	3.698	.001
Whole questionnaire of occupational stress	0.630 F = 12.0905 P < 0.001	Constant	2.453	.104		23.619	.000
		Children (No/Yes)	.405	.095	.450	4.251	.000
		OT sets per day (4 or less/5 or more)	-.298	.099	-.326	-3.021	.004
		Continuing education (No/Yes)	.267	.108	.265	2.469	.017

#SN = Staff Nurse, §EN = enrolled Nurse; †SSN = Senior Staff Nurse

Age was the only factor that contributed to stress related to resource and environmental problems (=.396, t = 3.076, P =.003). Older female nurses without bachelor degrees reported higher stress levels related to resource and environmental issues.

Female nurses who had children reported higher stress levels than those who had no children (=.450, t = 4.251, P =.000). Nurses who were working on 4 or less operation sets per day reported higher stress levels than those who were working on 5 or more operation sets daily (=-.326, t = -3.021, P =.004). Continuing

education was positive correlated to occupational stress (=.265, t = 2.469, P =.017).

Discussion

OT nurses practice in a multitude of settings with varying degrees in scope of practice, roles and responsibilities. Nurses perform nursing activities in the pre-operative, intra-operative and post-operative phases of the patients' surgical experience. They provide continuity of care throughout the peri-operative period using scientific and behavioral practices, with the eventual goal of meeting patients' individual needs.

Table 3. Comparison of score of occupational stressor domains of OT nurses

Domains	All OT nurses (n = 65)		Sub-Healthy nurses (n = 50)		Healthy Nurs- es (n = 15)		t value	p value
	Mean	SD*	Mean	SD	Mean	SD		
Professional and career issues	2.87	0.47	2.96	0.45	2.60	0.45	2.72	<0.01
Workload and time pressure	3.10	0.55	3.19	0.53	2.79	0.55	2.54	<0.05
Resource and environmental problems	2.48	0.70	2.58	0.72	2.16	0.55	2.08	<0.05
Patient care and interaction	2.60	0.53	2.69	0.53	2.32	0.42	2.48	<0.05
Interpersonal relationships and management issues	2.51	0.58	2.60	0.58	2.24	0.53	2.15	<0.05

*SD = standard deviation

The mean scores of all items (i.e. total subscale score divided by the number of items) were higher than 2.00, indicating that the nurses were indeed experiencing occupational stress. The 5 items with the highest scores were, in descending order, “workload is too heavy” (mean=3.69, SD=.61), “worrying about working errors” (mean=3.55, SD=.59), “low salary and benefits” (mean=3.51, SD=.53), “low social status” (mean=3.34, SD=.69), and “little chance of promotion and further study” (mean=3.20, SD=.73). The 5 items with the lowest scores were “lack of friendly cooperation between colleagues” (mean=2.09, SD=.74), “worried about patients’ sudden death” (mean=2.12, SD=.91), “lack of understanding and support among colleagues” (mean=2.20, SD=.75), “conflicts with nurse managers” (mean=2.22, SD=.80), and “patients ignore instructions” (mean=2.23, SD=.72). Among the 5 subscales, the subscale in which OT nurses reported the highest level of stress was WTP (mean= 3.10, S=.55), followed by PC (mean=2.87, SD=.47), PCIA (mean=2.60, SD=.53), IPRM (mean=2.51, SD=.58), and REP (mean=2.48, SD=.70) (Table 3).

Relationship of occupational stress and sub-health status

The scores of the five domains of occupational stress of sub-health OT nurses were higher than those of healthy OT nurses ($P < .05$ or $P < .01$) (Table 3).

Relationship of occupational stress and demographic status

The results of multiple linear regression analysis showed that the five subscales and the entire questionnaire on occupational stress, with independent variables of demographic status, were based on the data of

female nurses who did not hold a bachelor degree ($n = 53$), as there were only 6 male nurses and 6 bachelor degree holders in the sample (Table 4).

The results from the PC and PCIA subscales show that nurses who had children reported experiencing greater stress at work than nurses who had no children ($r = .436$, $t = 3.996$, $P = .000$ for PC; $r = .449$, $t = 4.034$, $P = .000$ for PCIA). Nurses who were working on 5 or more operation sets per day reported lower stress levels than those who were working on 4 or fewer sets per day ($r = -.292$, $t = -2.677$, $P = .010$ for PC; $r = -.294$, $t = -2.645$, $P = .011$ for PCIA). Nurses who were on day-shifts reported higher stress levels at work than those who were on night-shifts ($r = -.281$, $t = -2.572$, $P = .013$ for PC; $r = -.228$, $t = -2.050$, $P = .046$ for PCIA). Age, years of employment in the nursing profession, designation, working hours per week and continuing education were not significantly related to respondents’ stress level in the PC and PCIA subscales.

Female nurses who did not hold bachelor degrees and were employed in higher designations at work perceived greater stress in the area of work and time pressure ($r = .532$, $t = 5.258$, $P = .000$). Higher designation was also positively related to stress in the area of interpersonal relationships and management issues ($r = .460$, $t = 3.698$, $P = .001$).

The number of operation sets the nurses were working on per day ($r = -.298$, $t = -2.921$, $P = .005$) and working night shifts ($r = -.243$, $t = -2.443$, $P = .018$) were negatively related to stress levels arising from work and time pressure. Nurses who were attending continuing education while engaging in full-time employment concurrently reported higher stress levels arising from work and time pressure than those who were not doing so ($r = .220$, $t = 2.200$, $P = .033$).

Our results showed that workload and time pressure posed the most serious occupational stress to OT nurses. This finding is supported by a few studies done in mainland China (Li & Liu, 2000; Hong et al., 2003; Xianyu & Lambert, 2006; Yau et al., 2012), which also found workload to be the major source of stress reported by nurses. This finding is also consistent with McGrath et al.'s reports of western nurses (2003). This can be explained by the nature of nursing practice in operating theaters. Nursing practice in OTs is different from nursing practice in the wards. Operating theater nurses provide continuous service throughout the surgical intervention, especially the scrub nurse. Their work hours are dependent on the type and duration of operations. During operations, the scrub nurse works non-stop, thus explaining why heavy workload constituted the vital source of stress among OT nurses.

Besides the above reasons, staff shortage could be another important reason leading to over workload. In China, the ratio of nurses and midwives was 1.4:1000 of the population in year 2009 (World Health Organization, 2009), whereas UK has a ratio of 10.1:1000—more than 7 times that of China (World Health Organization, 2009). Expectedly, the shortage of nurses resulted in workload and time pressure being the most common stressor reported by OT nurses in this study. Moreover, nurses also complained about having to do too much useless paperwork or non-nursing work, for a lot of documents and records were still being changed from time to time due to nursing being a relatively new and underdeveloped profession in China.

The second most common source of occupational stress comes from the domain of professional and career issues. Our findings are supported by some studies on nurses in mainland China (Lambert et al., 2007; Li & Lambert, 2008; Yau et al., 2012). Compared with the experience of nurses in Western countries where the nursing profession is more developed, Chinese nurses reported a lack of autonomy and dependence on physicians' direction in practice (Lambert et al., 2007; Li & Lambert, 2008; Yau et al., 2012). OT nurses' work tends to be more passive than ward nursing. Nurses in OTs have to cater to the different personalities of surgeons and anesthesiologists with whom they work closely, rather than structuring their work by themselves. Having to do so, coupled with lower salaries and benefits than that of physicians, often makes nurses feel that their profession and social status are lower. Furthermore, higher education in the nursing profession is still relatively undeveloped, even though the health care and

education systems in mainland China have undergone much reform in the past 30 years. In 2010, there were only 65 master programs and 22 PhD programs offered in the whole of mainland China (Nurseworld.cn, 2011).

The domain of patient care and interaction constitutes the third most common source of occupational stress. With the adoption of the Regulation on the Handling of Medical Accidents in 2002 in China and greater public attention on quality of life and health in the country, awareness of legal rights among patients and their families is growing. Nurses now have to pay more attention to the needs and concerns of patients and their family members. OT nurses are often required to provide detailed answers to a plethora of questions posed by patients and family members, including questions that may be beyond nurses' scope of training and knowledge, and which only physicians are able to answer. All this put nurses frequently on the hot seat. In addition, nurses often feel unappreciated, for many patients and family members think that it is solely the surgeon's scalpel that cures the patient, often forgetting that nursing care is equally important to patients' post-operation recovery. As such, nurses often worry about making errors in nursing, while struggling with the daily demands of a thankless job. Although the current minimum educational qualification for entering the nursing profession in China is at least an advanced diploma degree, it is a common phenomenon that schools of nursing in China are still run by and within the medical faculty, rather than a faculty in its own right. This attests to the lack of recognition of nursing as a profession and undervaluation of the contribution of nursing and nurses in health care.

The domain of interpersonal relationships and management issues was the fourth most common source of occupational stress to OT nurse. This is consistent with a few studies, too (Kluger et al., 2003; Lambert et al., 2007; Kluger & Bryant, 2008). Due to the underdevelopment of the nursing profession in China OT nurses often feel a lack of understanding and respect from other health care personnel, inadequate understanding and support from nursing managers, and that they frequently receive criticisms from surgeons and nursing managers.

The domain of resource and environment problem constitutes the least common source of occupational stress to OT nurses in our study. This finding is in contrary to that of Yau et al.'s (2012) study, whose sample comprised nurse managers rather than nurses in direct nursing care. This is understandable, because the job

environment of nurse managers and OT nurses differ vastly. Nursing managers are situated in wards where they manage a variety of both nursing and non-nursing (i.e. management) issues, with frequent interruptions and distractions to attend to patients, family members, subordinate nurses and management. OT nurses, on the other hand, work behind the closed doors of operating theaters, away from major interruptions and distractions during operations.

The results from this present study show that nurses who had children reported higher stress levels than those without children in terms of professional and career issues, and patient care and interaction. In China, the influence of Confucianism sees women living up to strong sociocultural expectations to take the major responsibility for housework and educating children. These expectations still persist in spite of the recent opening of China, major reforms in the country, and more women joining the workforce (Xu et al., 2004). The triple load of housework, childcare and employment is putting tremendous pressure on Chinese women. Operating theater nurses employed in higher designations are the hardest hit. Thus, it is not surprising that our study has found that employment in higher designations was positively related to stress arising from workload and time pressure.

In addition, employment in higher designations was found to be positively related to stress arising from interpersonal relationships and management issues. We present a number of explanations for this phenomenon: First, nurses in higher designations are more likely to take on more roles at work, coupled with higher expectations placed on them. For instance, a senior staff nurse is usually required to arrive at the office at least half an hour earlier and leave the office half an hour later than a junior staff nurse. Second, nurses in higher designations are often given the responsibility to instruct and supervise nurses in lower designations, and help nurses-in-charge manage the ward, so it is no wonder that nurses in higher designations in our study reported that their workload was too heavy, that they had no time to implement psychological care to patients, that their nursing managers criticized them too much, and that the amount of understanding and support they had received from nurse managers were not enough.

The numbers of operation sets the nurses were working on per day and working night-shifts were negatively related to stress in professional and care issues, work and time pressure, and patient care and interaction.

These findings are contrary to the findings of a study on hospital nurses by Wu et al. (2010). The differences may be due to the nature of work in the OT. Working night-shifts in the OT requires nurses to be on call for emergency operations. Should there be no calls; nurses are able to obtain sufficient, proper rest. Further, participating in 5 or more operations a day is the norm for OT nurses in China. Between each operation, nurses have time to remove and clean the surgical equipment used in the previous operation, prepare for the next, and get some rest during breaks.

Occupational stress is the 'harmful physical and emotional responses that occur when the requirements of the job do not match the capabilities, resources, or needs of the worker' (Welker- Hood, 2006). Thus, it is not surprising that 76.9% of OT nurses in our study reported sub-health symptoms. This figure is higher than WHO's global survey data (75%) (as cited in Yan et al. 2005), and also higher than Kluger & Bryant's (2008) report on anesthetic technicians in New Zealand, where 24% of respondents described severe physical impairment, and 35% had moderate to severe mental impairment. The nature of nursing in OT—long hours, frequent overtime, being on constant alert to changes in patients' health condition—results in irregular mealtimes and interrupted rest, which, in turn, lead to high nervous state. The high strain placed on OT nurses may lead to the complete breakdown of their health. If the symptoms of sub-health are not treated timely, serious disease may occur, or even more nurses will choose to leave nursing in pursuit of jobs that exert lower occupational stress on their physical, emotional and mental health. It is hoped that the findings of our study will allow policy makers to confront the challenges of reducing occupational stress among nurses.

Study limitations

Although this study has provided useful information on nurses' occupational stress, sub-health, and the relationship between stress and sub-health, it is limited by the nature of quantitative data collection, whereby insights into respondents' personal thoughts and attitudes cannot be solicited. In addition, although the hospital where this study was conducted is typical of acute-care teaching hospitals in China, the sampling frame and sample size limit the generalizability of the results to the nursing population in other cities that are at different levels of development. Thus, studies using randomized and larger samples, combined with focus-group interviews, are recommended for future studies.

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