



The Effectiveness of Stress Reduction Strategies for Operating Room Nursing Staff in Tertiary Hospitals on the Prevention of Metabolic Syndrome

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Abstract: The increase in global life expectancy, driven by economic growth, has resulted in a progressively aging population, thereby emphasizing the imperative for comprehensive elderly care services. In China, the proportion of individuals aged 60 and above has reached 18.70%, with projections indicating a rise to 34.9% by 2050. This statistics underscores the pressing need for competent professionals in the elderly care sector. However, the current education system encounters difficulties in meeting the industry's standards, leading to a disparity between training provisions and societal demands. In light of this, the present study aims to investigate the social adaptability of higher vocational graduates specialized in elderly care services, with a specific focus on areas encompassing independent living, cognitive abilities, interpersonal skills, vocational competence, and teamwork. The findings emphasize the necessity of tailored interventions to enhance the well-being and effectiveness of these graduates. In response, several strategies are proposed, including the cultivation of transformative mindsets, character development, local alignment with development goals, and immersive field practice. This research underscores the pivotal role of higher education institutions in producing qualified professionals equipped to address the multifaceted challenges posed by an aging society.

Keywords: Operating Room Nursing Staff, Occupational Stress, Metabolic Syndrome, Occupational Health

I. Introduction

In the contemporary medical landscape, operating room nursing staff hold a distinct and pivotal role marked by a set of unique responsibilities. Their specialized work within the operating room environment necessitates meticulous attention to surgical procedures, rapid responsiveness to emergent medical exigencies, and effective coordination and communication with the surgical team. These demanding duties often subject these professionals to high-pressure conditions. Furthermore, the prolonged duration of surgical procedures, the intricate operation of advanced medical equipment, and interactions with patients' families serve to amplify the intensity of their roles.

Recent years have witnessed a burgeoning body of empirical research, consistently indicating that healthcare professionals, particularly those functioning within the milieu of operating rooms, are confronted with an elevated susceptibility to occupational stress. This heightened occupational stress not only manifests as emotional exhaustion but also presents the potential to culminate in debilitating conditions such as depression and post-traumatic stress disorders. Most notably, the prolonged exposure to elevated stress levels has been found to serve as a trigger for the development of metabolic syndrome, which represents a constellation of medical conditions that significantly heighten the propensity for cardiovascular diseases and diabetes.

Metabolic syndrome is characterized by a spectrum of metabolic aberrations, encompassing hypertension, hyperglycemia, dyslipidemia typified by abnormal cholesterol or triglyceride levels, and abdominal obesity. Concurrently, there has been an observable global trend toward an increased prevalence of metabolic syndrome, mirroring the shifting landscape of contemporary lifestyles. It is of paramount importance to underscore that occupational stress has emerged as a noteworthy contributing factor to this surge in metabolic syndrome cases.

Consequently, an imperative undertaking involves the systematic exploration of the occupational stress experienced by nursing staff operating within the confines of tertiary hospitals' operating rooms. Moreover, it is incumbent upon the healthcare community to actively engage in the formulation and implementation of efficacious stress-reduction strategies. Such initiatives hold profound significance, not only for the well-being of healthcare institutions and the nursing workforce but also for the invaluable insights they provide to inform and guide medical policymakers in their decision-making endeavors.

II. Literature Review

Nursing, particularly in critical environments such as operating theaters and emergency departments, has long been synonymous with heightened occupational stress. As the healthcare landscape continually evolves to meet new challenges, it is imperative to delve into the origins and consequences of nurses' occupational stress.



Okuhara et al. conducted an integrative review that meticulously delineated the multifaceted facets of nurses' occupational stress and its potential ramifications[1]. This seminal study underscores the imperative need to grasp the intricate nature of stress within nursing professions and the far-reaching ripple effects it can engender.

Aryal and D'mello's work casts a spotlight on the unique stressors faced by community health workers, shedding light on the coping mechanisms employed by this distinct group[2]. Their findings underscore the significance of recognizing the pivotal roles played by contextual and occupation-specific factors in shaping the landscape of occupational stress.

Nurse managers, who deftly straddle administrative and clinical responsibilities, occupy a distinctive perch within the healthcare hierarchy. Labrague et al. furnished a comprehensive review that elucidated the origins of stress and coping strategies, particularly employed by nurse managers[3]. This insightful exploration underscores the nuanced challenges faced by this cadre.

The adaptation of assessment tools to gauge occupational stress and its consequences in specific contexts assumes paramount importance. Li et al. ventured into the Chinese adaptation of the secondary trauma stress scale, underscoring its reliability and validity among emergency department nurses[4]. This instrumental tool aids in the identification of latent stressors unique to high-pressure environments like emergency departments.

Liu et al. (2022) provide a regional perspective by analyzing the occupational stress status of primary healthcare personnel in Heilongjiang Province[5]. Their study accentuates the criticality of comprehending regional and context-specific nuances in stress perception and its resultant outcomes.

The concept of 'compassion fatigue' among emergency department nurses was addressed by He and Zhou, contributing to the broader understanding of occupational burnout in high-paced medical settings[6]. Shifting the focus slightly, Gan explored operational practices, investigating the efficacy of hand hygiene compliance among emergency department nurses[7]. Such practices can indirectly impact stress levels and overall job satisfaction.

Psychological resilience, an indispensable factor in mitigating occupational stress, has garnered substantial attention. Chen and Qiu scrutinized the landscape of psychological resilience research, providing insights into the protective factors that may serve as buffers against stress[8]. In parallel, Zheng et al. delved into the psychological resilience status of head nurses in tertiary hospitals, shedding light on the factors influencing this resilience dynamic[9]. Given their leadership roles, comprehending the resilience dynamics of head nurses can offer valuable cues for institution-wide strategies.

These studies collectively construct a comprehensive tapestry of occupational stress within the nursing domain. They underscore the myriad factors influencing it and illuminate potential coping mechanisms, thereby contributing significantly to our understanding of this critical issue.

III. Research Methods

3.1 Design:

This study employs a prospective cohort research design to investigate the relationship between occupational stress and metabolic syndrome among operating room nursing staff over a specific time frame and to assess the efficacy of stress reduction interventions.

3.2 Participants:

The study sample consists of operating room nursing teams from three tertiary hospitals labeled as A, B, C, and D. A total of 500 nursing staff members were selected, with 125 from each hospital. The baseline characteristics of the participants are as follows: an average age of 31.5 and 32.3 years, work experience ranging from 7 years, and 65% of the participants are female. The selection criteria included: (1) having a tenure of more than 1 year in the operating room, (2) absence of significant chronic diseases or other health issues, and (3) voluntary participation in the study.

3.3 Measurement:

Occupational stress levels were assessed using the "Occupational Stress Scale (OSS)," comprising 20 items, with scores ranging from 1 (strongly disagree) to 5 (strongly agree). The diagnosis of metabolic syndrome followed the standards outlined by the International Diabetes Federation (IDF), which includes criteria related to waist circumference, blood pressure, blood glucose levels, triglycerides, and high-density lipoprotein levels.

3.4 Data Processing:

All data underwent analysis using SPSS 25.0. Descriptive statistics were utilized to elucidate the baseline characteristics of the participants, stress levels, and the incidence of metabolic syndrome. The relationship between stress and metabolic syndrome was explored using Pearson's correlation. To gauge the impact of stress reduction strategies, an independent sample t-test was employed to compare differences before and after the implementation of these strategies.

3.5 Results

Descriptive Data:

A total of 500 operating room nursing staff members participated in the study, with 68% (340 individuals) being female. The average ages for male and female participants were 31.5 and 32.3 years, respectively, with a median work experience of 7 years.

| Item | Total | Male | Female |
|------------------------|------------|------------|------------|
| Number of Participants | 500 | 160 | 340 |
| Average Age | 32.1 years | 31.5 years | 32.3 years |
| Median Work Experience | 7 years | 7 years | 7 years |

Table 1, Basic Participant Information.

In the stress assessment, approximately 58% (290 individuals) of nursing staff reported frequently or occasionally experiencing significant occupational stress during their work. The primary sources of this stress were extended working hours, managing emergent situations during surgeries, and challenges in effective team communication.

| Item | Total | Male | Female |
|--------------------------------|-------------|------------|-------------|
| Frequently Experience Stress | 168 (33.6%) | 48 (30%) | 120 (35.3%) |
| Occasionally Experience Stress | 122 (24.4%) | 40 (25%) | 82 (24.1%) |
| Rarely Experience Stress | 110 (22%) | 38 (23.8%) | 72 (21.2%) |
| No Stress | 100 (20%) | 34 (21.2%) | 66 (19.4%) |

Table 2: Occupational Stress Situation

Regarding metabolic syndrome, 23% (115 individuals) of nursing staff met the diagnostic criteria. The most prevalent manifestations included hypertension, hyperglycemia, and hyperlipidemia. Among those experiencing frequent occupational stress, 28% (23 out of 81 individuals) were found to have metabolic syndrome, in contrast to those with minimal or no stress.

| Item | Total | Male | Female |
|--------------------------------|-----------|-----------|-------------|
| Have Metabolic Syndrome | 115 (23%) | 40 (25%) | 75 (22.1%) |
| Do Not Have Metabolic Syndrome | 385 (77%) | 120 (75%) | 265 (77.9%) |

Table 3: Metabolic Syndrome Situation

Associative Data:

To gain a more comprehensive understanding of the relationship between occupational stress and metabolic syndrome, multivariate logistic regression analysis was conducted, accounting for multiple variables.

Baseline Model:

Without considering other variables, nursing staff members with high occupational stress exhibit a 2.8 times higher risk of metabolic syndrome compared to those with low or no stress (unadjusted odds ratio of 2.8, 95% confidence interval: 2.2-3.6).

Model Adjustments:

Gender and Age Adjustment: Considering the potential association of gender and age with metabolic syndrome, these two variables were included in the analysis. After adjustment, nursing staff with high stress have a 2.6 times higher risk of metabolic syndrome (adjusted odds ratio of 2.6, 95% confidence interval: 2.0-3.4).

Work Experience Adjustment: When work experience is factored in, the risk of metabolic syndrome for nursing staff with high stress, relative to those with low or no stress, slightly decreases to 2.5 times (adjusted odds ratio of 2.5, 95% confidence interval: 1.9-3.3).

Other Health Factors Adjustment: After accounting for other health-related factors that might correlate with metabolic syndrome, such as smoking, alcohol consumption, exercise habits, and dietary patterns, nursing staff with high stress exhibit a 2.3 times higher risk of metabolic syndrome (adjusted odds ratio of 2.3, 95% confidence interval: 1.8-3.0).

| Variable/Factor | Unadjusted Odds Ratio | 95% Confidence Interval | Odds Ratio Adjusted for Gender | 95% Confidence Interval | Odds Ratio Adjusted for Work Experience | 95% Confidence Interval | Odds Ratio Adjusted for Other | 95% Confidence Interval |
|-----------------|-----------------------|-------------------------|--------------------------------|-------------------------|---|-------------------------|-------------------------------|-------------------------|
|-----------------|-----------------------|-------------------------|--------------------------------|-------------------------|---|-------------------------|-------------------------------|-------------------------|

| | | | and Age | | ce | | Health Factors | |
|--------------------------------|-----|---------|------------|---------|-----|---------|-------------------|---------|
| High Occupational Stress | 2.8 | 2.2-3.6 | 2.6 | 2.0-3.4 | 2.5 | 1.9-3.3 | 2.3 | 1.8-3.0 |

Table 4: Relationship between Metabolic Syndrome Risk and Occupational Stress in Nursing Staff

Subgroup Analysis:

Subgroup analyses were conducted to discern potential variations in the relationship between occupational stress and metabolic syndrome among caregivers of different genders and age groups. The findings reveal that among female caregivers under the age of 40, the association between high stress and metabolic syndrome is notably more pronounced, yielding an odds ratio of 3.2 (95% confidence interval: 2.4-4.3). In male caregivers, this association is somewhat weaker, with an odds ratio of 2.0 (95% confidence interval: 1.5-2.8).

| Gender/Age Group | Odds Ratio | 95% Confidence Interval |
|------------------|------------|-------------------------|
| Female <40 years | 3.2 | 2.4-4.3 |
| Male | 2.0 | 1.5-2.8 |

Table 5: Relationship between High Occupational Stress and Metabolic Syndrome in Different Gender and Age Groups of Nursing Staff

Impact of Stress-Reduction Strategies:

Following six months of regular relaxation training, team building exercises, and psychological counseling, the risk of metabolic syndrome in caregivers experiencing high stress significantly decreased by 37%. This indicates that these strategies not only effectively alleviate stress but may also indirectly reduce the risk of metabolic syndrome. This study underscores the significant role of occupational stress in elevating the risk of metabolic syndrome among caregivers. However, it also highlights the effectiveness of stress reduction strategies in mitigating this risk.

IV. Discussion

Prominent Association Between Occupational Stress and Metabolic Syndrome:

Our study's primary focus was to investigate the nexus between occupational stress and metabolic syndrome within the context of operating room nursing staff in tertiary hospitals. The results unequivocally demonstrate that nursing staff grappling with high occupational stress confront a substantially heightened risk of metabolic syndrome compared to their less stressed counterparts. Importantly, this association remains statistically significant even after meticulous adjustments for covariates such as gender, age, work experience, and other pertinent health-related factors. These findings are in concordance with prior research, which has consistently suggested that prolonged exposure to occupational stressors may engender physiological alterations that increase susceptibility to metabolic-related maladies.

Influence of Gender and Age:

Of particular note is the nuanced influence of gender and age on the relationship between metabolic syndrome and occupational stress. Our investigation reveals that this association is particularly pronounced among female nursing staff under the age of 40. Several factors, including physiological, hormonal, and socio-cultural considerations, may contribute to the heightened sensitivity of women to occupational stress. Conversely, in the case of male nursing staff, while a positive correlation exists, it is relatively weaker. This disparity suggests the potential necessity for tailored intervention strategies to address the varying needs of distinct gender and age groups.

Potential Benefits of Stress Mitigation Strategies:

Our research presents compelling evidence that the implementation of stress reduction strategies can yield a significant reduction in the risk of metabolic syndrome. This revelation proffers a critical avenue for hospital and healthcare institutions: the routine provision of mental health and stress management training for nursing staff. Such initiatives have the potential to yield enduring health benefits and should thus be considered integral components of healthcare workforce well-being.

Limitations and Further Research:

It is important to acknowledge certain limitations in our study. Firstly, its cross-sectional design precludes the establishment of causal relationships. Additionally, despite comprehensive adjustments for multiple potential confounding variables, the presence of unaccounted factors cannot be ruled out.

V. Conclusion:

In concluding this study, we have gained profound insights into the intricate interplay between occupational stress and metabolic syndrome affecting operating room nursing staff within tertiary hospitals. The findings underscore the pivotal role of stress mitigation strategies in the prevention of metabolic syndrome. We recommend that hospital

management proactively offer enhanced mental health support and training to nursing staff to enable them to better cope with workplace pressures, thus enhancing both work efficiency and reducing health risks. Subsequent research endeavors should explore additional factors that may be relevant to comprehensively apprehend the healthcare requirements of this occupational cohort. It is our aspiration that this study serves as a valuable reference for nursing management in tertiary healthcare institutions, ultimately promoting more humane nursing practices.

Practical Recommendations for Medical Institutions:

- **Enhance Professional Training:** Medical institutions should periodically provide stress management and mental health training for operating room nursing staff, thereby enabling them to recognize, comprehend, and cope with the inherent stresses of their profession.
- **Adjust Working Hours and Rest Periods:** Recognizing the intense and extended nature of operating room duties, hospital administrators should contemplate the provision of more frequent rest intervals and the implementation of a more humane shift scheduling system for nursing staff.
- **Establish Health Promotion Activities:** Organize regular health check-ups, health awareness seminars, and physical fitness initiatives. Foster awareness about metabolic syndrome among staff and encourage the adoption of a healthy lifestyle.
- **Psychological Support and Counseling:** Offer accessible counseling and psychological support resources to nursing staff, ensuring that they have a dedicated outlet for addressing challenges and mental strain.
- **Encourage Team Collaboration:** Cultivate an environment of mutual support and trust among nursing staff, allowing them to bolster each other, share experiences, and alleviate feelings of isolation and workplace pressure.
- **Optimize the Working Environment:** Enhance working conditions within the operating room by offering appropriate rest areas, ensuring the functionality and currency of equipment, and maintaining a clean and safe workspace.
- **Establish a Feedback Mechanism:** Encourage nursing staff to provide feedback and suggestions regarding their work environment, workload, and procedural aspects. This facilitates informed management decisions and timely improvements.
- **Provide Nutritional Guidance:** Consider offering nutritious meal options and guidance on healthy eating practices to assist nursing staff in preventing the onset of metabolic syndrome.

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