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Review Article

Physiotherapy Section

A Narrative Review on Multifactorial Relationship between Sleep Quality, Work Family Conflict and Musculoskeletal Disorders: Implications for Quality of Life among Nurses

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ABSTRACT

This narrative review examines the complex interrelationship between Work-Related Musculoskeletal Disorders (WRMSDs), sleep disturbance, and Work Family Conflict (WFC) among nursing professionals. Through systematic synthesis of contemporary literature, authors propose a multidirectional model wherein these occupational stressors interact synergistically to compromise nurses' Quality of Life (QoL) and professional sustainability. WRMSDs, prevalent due to physical demands including patient mobilisation and prolonged standing, correlate significantly with sleep quality metrics, creating bidirectional pathways in which pain disrupts sleep and inadequate sleep lowers pain thresholds. WFC, exacerbated by irregular scheduling and emotional labour requirements, is significantly associated with both sleep disturbance and musculoskeletal symptoms. These interconnected factors collectively impact physical functioning, psychological wellbeing, and social relationships through multiple pathways. The review suggests that interventional strategies targeting these interconnected domains simultaneously may yield superior outcomes compared with traditional integrated approaches. This integrated understanding provides healthcare organisations with opportunities to develop comprehensive wellbeing programmes addressing physical, psychological, and social determinants of occupational health, ultimately improving the nursing workforce sustainability and care quality.

Keywords: Nurses, Occupational diseases, Professional burnout, Stress psychological, Work-life balance, Workplace

INTRODUCTION

The nursing profession entails significant occupational hazards that extend beyond immediate workplace safety concerns. Contemporary research suggests a complex interplay between physical occupational stressors (WRMSDs), physiological disruptions (sleep disturbance), and psychosocial challenges (WFC) that collectively influence nurses' QoL and professional longevity. While these factors have frequently been investigated in isolation, their interdependent relationships warrant further exploration [1-4]. This review proposals an integrated framework for conceptualising these relationships, positing that interventions addressing multiple domains simultaneously may yield superior outcomes compared with traditional approaches. By elucidating these interconnections, healthcare organisations can develop more effective strategies to support the nursing workforce sustainability.

Musculoskeletal Disorders in Nursing: Prevalence and Correlates

The WRMSDs represent a significant occupational health concern in nursing populations worldwide. The physical demands of nursing practice, including patient mobilisation, prolonged standing, and repetitive tasks, contribute to musculoskeletal pathology throughout the professional lifespan [1]. Epidemiological data consistently demonstrate elevated prevalence of spinal, shoulder, and lower-extremity disorders among nursing professionals compared with general workforce populations [2].

Annual prevalence of WRMSDs among nurses ranges from 77.2% to over 80% globally [4]. Among perioperative nurses, the highest prevalence was for lower back pain (62%), followed by knee pain (47%), shoulder pain (44%), waist pain (42%), and neck pain (39%). Recent investigations have identified significant correlations between WRMSD severity and sleep quality metrics [5,6]. Nurses report poor sleep quality, high levels of mental health symptoms, and musculoskeletal pain complaints. Notably, pain-related sleep disruption appears to establish a bidirectional relationship, wherein inadequate sleep lowers pain thresholds and potentially exacerbates WRMSD symptoms. There is a ninefold increased risk of presenting musculoskeletal symptoms for professionals with poor sleep quality [OR = 9.0 (95% CI, 1.5-53.9)]. The prevalence of poor sleep quality among night-shift nurses reached as high as 90.1% [5,7]. This relationship may be further moderated by psychosocial factors, including occupational stress and WFC [8]. Longitudinal data suggest that WRMSD development significantly predicts subsequent professional disengagement, absenteeism, and intention to leave nursing practice [7]. Furthermore, the economic burden of WRMSDs extends beyond direct healthcare costs to include reduced productivity, disability claims, and workforce replacement expenses [5,8].

Sleep Quality among Nursing Professionals

Sleep disturbance is a prevalent concern among nursing professionals, particularly those engaged in shift work or extended-hour schedules [8,9]. Circadian rhythm disruption, irregular sleep–wake cycles, and restricted sleep opportunity collectively contribute to diminished sleep quality in this population [6]. Recent research indicates that approximately 57-83% of nurses report subjective sleep quality below normative thresholds [5,7]. Sleep quality appears to function as both an outcome of and a contributor to occupational stressors. Contemporary investigations have identified sleep disturbance as a significant mediator in the relationship between WFC and self-reported health status among hospital-based nurses [3]. This finding suggests that sleep quality may represent a critical intervention point for improving health outcomes in this population [7,8].

The physiological and psychological sequelae of chronic sleep disruption include impaired cognitive function, altered immune

response, metabolic dysregulation, and increased psychological distress [7,8]. These outcomes may compromise clinical decision-making capability, increase error susceptibility, and diminish therapeutic engagement, with implications for both provider wellbeing and patient safety [6,8].

Work-Family Conflict (WFC): Antecedents and Consequences

The WFC represents a form of inter-role conflict wherein the demands of professional and domestic domains are perceived as incompatible [10,11]. The nursing profession presents unique vulnerabilities to WFC due to irregular scheduling, emotional labour requirements, and limited autonomy over workflow [12]. Contemporary conceptualisations recognise the bidirectional nature of this construct, distinguishing between Work Interference with Family (WIF) and Family Interference with Work (FIW) [13]. Empirical evidence indicates that rotating shift schedules significantly predict WFC intensity among nursing professionals [13]. This relationship appears partially mediated by sleep disturbance [14], suggesting a causal pathway wherein schedule irregularity disrupts sleep architecture, subsequently reducing capacity for effective role integration [12]. Notably, WFC demonstrates significant associations with both sleep quality metrics and WRMSD symptomatology in nursing populations [10,12].

The consequences of persistent WFC extend beyond psychological distress to include physiological manifestations [12,14]. Recent investigations report significant correlations between WFC intensity and inflammatory biomarkers, suggesting potential pathways to somatic symptomatology, including musculoskeletal pain [14]. Furthermore, longitudinal data indicate that elevated WFC predicts subsequent development of depressive symptoms and reduced occupational engagement [14].

Quality of Life (QoL) Implications

QoL in healthcare professionals represents a multidimensional construct encompassing physical functioning, psychological wellbeing, social relationships, and environmental conditions [4]. The interdependent relationships between WRMSDs, sleep disturbance, and WFC appear to exert cumulative effects on nursing QoL through multiple pathways [15]. Physical-domain effects include functional limitations, pain-related activity restriction, and reduced energy for discretionary activities [15]. Psychological implications encompass emotional exhaustion, reduced self-efficacy, and symptoms of anxiety or depression [16]. Social consequences include diminished relational quality, reduced participation in community activities, and impaired work-team cohesion [16,17].

Notably, QoL metrics demonstrate significant correlations with patient care quality indicators, suggesting that interventions targeting provider wellbeing may yield concurrent improvements in healthcare delivery outcomes [4]. This relationship underscores the organisational imperative to address factors compromising nursing QoL [16].

Theoretical Integration

The relationships described herein can be conceptualised within several theoretical frameworks. The job-demands-resources model provides a useful heuristic for understanding how occupational demands (physical exertion, emotional labour, schedule irregularity) without commensurate resources (recovery time, ergonomic support, schedule control) contribute to strain outcomes [12,13]. Similarly, Conservation of Resources (COR) theory elucidates how resource depletion in one domain (e.g., physical energy depleted by WRMSDs) necessitates compensatory resource expenditure, potentially initiating loss spirals when resources become insufficient for effective role performance across domains [9,10]. Allostatic-load models further explain how chronic exposure to occupational stressors may induce physiological dysregulation across multiple systems, including musculoskeletal, neurological, and endocrine function. This perspective provides a biological framework for understanding the interrelationships between physical, psychological, and social stressors in nursing populations.

Interventional Implications

The interrelated nature of WRMSDs, sleep disturbance, and WFC suggests potential benefits from integrated interventional approaches. Evidence-based strategies may include:

1. **Ergonomic interventions:** Implementation of mechanical lift equipment, ergonomic assessment protocols, and environmental modifications to reduce biomechanical strain and WRMSD risk [11].
2. **Sleep hygiene programs:** Education regarding sleep optimisation strategies specific to shift work, implementation of evidence-based scheduling practices, and provision of recovery facilities for post-shift rest when needed [18].
3. **Organisational policies:** Development of family-supportive supervisory practices, implementation of self-scheduling systems where feasible, and creation of predictable time-off protocols to facilitate work-life integration [15,16].
4. **Multimodal approaches:** Comprehensive wellness programs addressing physical, psychological, and social determinants of occupational health through integrated intervention delivery [16].

Preliminary evidence suggests that multicomponent interventions yield superior outcomes compared to single-domain approaches, potentially due to synergistic effects addressing multiple pathways simultaneously.

Research Directions

Several research priorities emerge from this review. First, longitudinal investigations are needed to clarify temporal relationships between WRMSDs, sleep disturbance and WFC, facilitating identification of optimal intervention points. Second, investigation of potential moderating variables (e.g., organisational culture, individual resilience factors) may elucidate differential vulnerability to these occupational stressors. Finally, rigorous evaluation of integrated interventional approaches is necessary to establish implementation guidelines for healthcare systems.

CONCLUSION(S)

The nursing profession presents unique occupational challenges that interact in complex ways to influence provider wellbeing. This review proposes that WRMSDs, sleep disturbance and WFC function as interconnected elements within a dynamic system rather than as isolated stressors. Understanding these relationships provides healthcare organisations with opportunities to develop more effective approaches to nursing workforce sustainability. By addressing these factors through integrated interventions, healthcare systems may simultaneously improve provider QoL, reduce turnover intentions, and enhance care quality. Such approaches represent a promising direction for addressing contemporary challenges in nursing workforce sustainability.

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