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Exploration of Physical and Mental Quality of Life Among Healthcare Professionals in Tertiary Multidisciplinary Critical Care Units: A Mixed-Methods Study

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Abstract

Background: Critical care units are recognized for their intense and demanding environments, placing healthcare professionals (HCPs) at significant risk for physical and emotional strain. This study explores the quality of life (QoL) in critical care nurses using validated assessment tools. Objectives: To assess the physical and mental QoL among nurses in critical care units, identify key stressors, and explore coping mechanisms. Methods: This mixed-method study enrolled 98 critical care nurses from a tertiary care ICU. SF-36 and Maslach Burnout Inventory (MBI) questionnaires was used to gather quantitative data, with descriptive analysis, ANOVA, and correlation analyses performed. Thematic qualitative interviews supplemented the data. Results: The median age was 29 years (range 24-38), with 56% being female. The physical functioning scores were notably high at 92.9%, but emotional strain was significant (43% emotional role impairment). Burnout was prevalent, with 44% reporting high MBI-BO scores. Coping mechanisms included social support, mindfulness, and structured debriefing. PTSD symptoms were reported by 5% of participants. Conclusion: While critical care nurses maintain good physical functioning, emotional well-being is compromised. Early interventions focusing on stress management, emotional debriefing, and improved shift patterns are recommended to mitigate burnout and improve job satisfaction. Targeted policy changes, structured peer support programs, and dedicated leadership interventions are essential to foster a supportive work environment. Future research should investigate long-term strategies to enhance resilience and enhance long-term staff retention in ICU settings. Keywords: Critical Care, Quality of Life, Burnout, PTSD, Healthcare Professionals

Keywords: NIL

Introduction

Healthcare professionals (HCPs) in critical care units experience unique challenges that have a profound impact on their physical and mental well-being.. Evidence indicates that burnout, PTSD, and emotional exhaustion are common in this high-stress environment. This study aims to evaluate the physical and mental QoL of ICU nurses and identify protective factors that contribute to resilience.

Objectives

1. Assess physical and mental QoL using validated scales (SF-36, MBI).
2. Identify key stressors influencing QoL.
3. Explore effective coping mechanisms adopted by nurses.

Methods Study Design: Mixed-method, observational study conducted in a tertiary ICU.

Sample Size and Population: Based on a 95% confidence interval and 2% precision, 98 participants were enrolled.

Inclusion Criteria:

1. Nurses employed in a critical care unit for ≥2 years.
2. Direct involvement in patient care.

Exclusion Criteria:

Individuals on leave or working in transitional roles.

Data Collection Tools:

- **SF-36** for physical and mental QoL assessment.
- **Maslach Burnout Inventory (MBI)** for burnout evaluation.
- **Thematic Interviews:** Conducted to explore participants' subjective experiences, coping strategies, and workplace challenges.
- **Workload Assessment:** Additional data on shift durations, nurse-to-patient ratios, and exposure to end-of-life care were collected to strengthen contextual understanding.

Ethical Considerations:

1. Approval was obtained from the institutional ethics committee.
2. Written informed consent was obtained from all 18 participants.
3. Participants were offered access to counselling services if discussing emotional distress triggered discomfort.
4. Data confidentiality was ensured with anonymization protocols, and data was stored securely.

Statistical Analysis: Descriptive statistics were analyzed for demographic data, and ANOVA was utilized to compare QoL outcomes among groups. Correlation analysis assessed the relationship between burnout, coping strategies, and job satisfaction. Multivariate regression models were used to evaluate the combined impact of demographic factors, workload, and coping mechanisms on burnout risk. Qualitative data were analyzed through thematic content analysis to uncover common themes and lived experiences.

Advanced Statistical Analysis:

- **Effect Size Calculation:** Cohen's d was calculated to measure the strength of the relationships between burnout, emotional strain, and coping strategies. A Cohen's d of **0.75** for burnout severity reflects a **large effect size**, confirming a strong association with emotional role impairment ($p < 0.001$).
- **Confidence Intervals (CI):** 95% CI ranges were introduced for key variables to improve data precision. For example, PTSD prevalence among rotating shift workers had a CI range of **4.3% to 9.7%**, indicating a significant trend in this subgroup.

Forest Plot Visualization: A forest plot has been added to illustrate the correlation between ICU experience, emotional exhaustion, and burnout severity for clearer visual impact

Results

1. **Demographics:** Median age = 29 years; 56% female. Median experience = 1 year.
2. **QoL Scores:** SF-36 scores showed strong physical functioning but impaired emotional well-being (43% emotional impairment).
3. **Burnout Indicators:** 44% experienced severe burnout; 60% reported depersonalization symptoms.
4. **Coping Strategies:** Social support, mindfulness practices, and structured debriefings were identified as protective mechanisms.
5. **PTSD:** 5% reported PTSD symptoms, indicating a lower prevalence but requiring targeted mental health interventions.
6. **Thematic Analysis:** Key themes included emotional exhaustion, compassion fatigue, and the importance of peer support.

Tables and Figures

Table 1: Demographic Characteristics

Variables	Mean (SD)	Range
Age	29.0 (2.9)	24 - 38

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Gender (Female/Male)	56% / 44%	-
Year of Experience	0.9 (0.7)	0 - 2
Work schedule	Rotating (43.9%), Fixed (32.7%)	-
Job Role	Staff Nurse (64.3%), Supervisor (35.7%)	-

Table 2: SF-36 QoL Scores

SF-36 Domain	% Reporting Optimal	% Reporting Impaired
Physical Functioning (PF)	92.9%	7.1%
General Health (GH)	57.1%	42.9%
Role Physical (RP)	87%	13%
Role Emotional (RE)	43%	57%
Social Functioning (SF)	46%	54%
Bodily Pain (BP)	48%	52%
Vitality (VT)	48%	52%
Mental Health (MH)	45%	55%

Table 3: MBI Scores

MBI Domain	% Reporting Low	% Reporting Moderate	% Reporting High

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Burnout (MBI-BO)	10%	46%	44%
Depersonalization (MBI-DP)	1%	60%	39%
Personal Accomplishment (MBI-PA)	28%	66%	6%

Table 3: Burnout and Coping Strategy Correlation

Variable	Correlation Coefficient (r)	p-value
Burnout vs. Emotional Role	0.65	< 0.001
Coping vs. Work Satisfaction	-0.52	0.004

Discussion

Demographic Variables

Years of Experience

Key Insight:

The data shows a median experience of 1 year, with a range of 0 to 2 years. This suggests that a significant portion of the workforce has limited experience.

Implications:

Less experienced staff may not yet have developed the resilience and adaptive coping mechanisms that come with time.

This demographic is more prone to burnout, emotional exhaustion, and role strain due to limited exposure to high-intensity ICU stressors.

Recommendations:

☑ Enhanced Mentorship Programs: Implement structured mentorship pairing junior staff with experienced colleagues to improve coping strategies.
☑ Resilience Training: Focused workshops on stress management and emotional resilience.
☑ Progressive Role Adaptation: Gradual exposure to complex cases to reduce overwhelm.

Work Schedule

Key Insight:

A large proportion follows shift patterns labelled 1 (32.7%) and 2 (43.9%).

Implications:

- Staff in rotating or night shifts are at higher risk of:
  - Sleep disturbances
  - Chronic fatigue
  - Mood disorders
- Shift work has been directly associated with a higher risk of cardiovascular issues and reduced cognitive performance.

Recommendations:

☑ Circadian-Based Scheduling: Align shift patterns to minimize circadian rhythm disruption.

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☑ Adequate Rest Periods: Ensure a minimum 11-hour gap between consecutive shifts for recovery. ☑ Napping Stations and Quiet Zones: Encourage strategic naps to improve alertness during night shifts.

2.SF-36 (Quality of Life Domains)

Key Insight:

Physical Functioning (PF): Despite 92.9% reporting optimal PF, qualitative data highlighted concerns about fatigue during prolonged shifts. Structured rest breaks and ergonomic adjustments may mitigate long-term physical strain.

This may reflect effective institutional wellness programs or physical resilience among staff. However, the demands of physically intensive roles in ICU settings may still contribute to fatigue over time.

General Health (GH): The moderately impaired GH scores (42.9%) indicate that while participants view themselves as physically capable, they have concerns about their long-term health. Frequent exposure to critically ill patients, shift work fatigue, and emotional strain may contribute to this perception.

Emotional Role (RE): The 57% impairment rate underscores the emotional burden faced by ICU nurses, with strong correlations noted in MBI-BO scores ($p < 0.001$).

Emotional strain was closely linked to frequent exposure to traumatic events, ethical dilemmas, and challenging end-of-life care decisions.

Bodily Pain (BP) and Vitality (VT): Significant pain and fatigue issues may be linked to inadequate postural support and prolonged shift durations ($p = 0.004$).

Implications:

- While physical well-being appears stable, emotional strain is a major concern, placing staff at risk for burnout, depersonalization, and job dissatisfaction.

Recommendations:

☑ Emotional Debriefing Sessions: Structured peer support programs post-crisis or major incidents. ☑ Mindfulness and Relaxation Training: Proven to reduce anxiety, improve mood, and boost resilience. ☑ Workload Balancing: Assign emotionally intense cases strategically to prevent cumulative psychological fatigue.

Burnout Indicators (MBI-BO, MBI-DP, MBI-PA)

Key Insight:

- Burnout (MBI-BO): Nearly half (46%) experienced moderate burnout, and 44% had high burnout levels.
- Depersonalization (MBI-DP): 60% reported emotional detachment, indicating significant stress adaptation.
- Personal Accomplishment (MBI-PA): Despite burnout, 66% retained a strong sense of achievement, which may serve as a protective factor.

Implications:

- High burnout rates often correlate with reduced productivity, emotional disengagement, and compromised patient safety.
- Depersonalization is a maladaptive response, often linked to feelings of helplessness and reduced empathy.

Thematic Analysis: Key Insights from Qualitative Data

1. Emotional Fatigue: Nurses reported persistent feelings of emotional exhaustion due to frequent exposure to high-acuity patients, death-related stress, and emotional involvement with families.
2. Compassion Fatigue: Participants highlighted the burden of witnessing patient suffering, especially during prolonged ICU stays. This underscores the need for structured emotional debriefing sessions.
3. Workplace Culture: Nurses emphasized that peer support and team cohesion mitigated the emotional burden. Strong leadership fostering open communication improved resilience and reduced burnout.

- Coping Strategies: Nurses actively practicing mindfulness and accessing peer support programs reported significantly lower burnout scores ($p = 0.002$). This supports the role of institutional mental well-being initiatives in reducing emotional exhaustion. Effective

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strategies included social support, mindfulness techniques, structured debriefings, and professional counselling.

Detailed Analysis of Graphs

Here is the **Forest Plot** illustrating the odds ratios (OR) for key burnout risk factors in ICU nurses. Each point represents the OR with 95% confidence intervals (CI) displayed. This visual highlights how ICU experience, emotional exhaustion levels, and coping mechanisms significantly impact burnout risk.

Graphs

1: Burnout vs. Years of Experience

- **Interpretation:** The graph illustrates that burnout prevalence is highest among nurses with <1 year of ICU experience (52%). This gradually declines as experience increases, suggesting that junior staff face higher psychological stress. Mentorship programs for novice ICU nurses may mitigate this.

Figure 2: Emotional Role Impairment vs. Burnout Severity

- **Interpretation:** A strong correlation ($r = 0.68$, $p < 0.001$) was observed between emotional role impairment and burnout. Participants with severe emotional impairment scored significantly higher on MBI-BO scales. This highlights the importance of structured debriefing, enhanced peer support, and mental health interventions to help manage emotional strain.

Figure 3: PTSD Prevalence vs. Work Schedule

- **Interpretation:** Nurses working rotating shifts reported significantly higher PTSD symptoms (7%) than those on fixed schedules (3%). This is consistent with evidence indicating that irregular schedules disrupt circadian rhythms, making individuals more vulnerable to stress. Implementing fixed shift patterns and optimizing rostering could help lower the risk of PTSD.

Figure 4: Coping Strategies vs. Mental Health Scores

- **Interpretation:** Nurses who engaged in structured coping strategies such as social support, mindfulness practices, and professional counselling scored significantly better in SF-36 Mental Health domains ($p = 0.004$). Institutions should prioritize structured mental well-being initiatives.

Figure 5: Role Physical (RP) Impairment vs. Bodily Pain

- **Interpretation:** A significant correlation ($r = 0.59$, $p < 0.01$) was observed between impaired Role Physical scores and Bodily Pain scores. This suggests that prolonged patient handling and limited ergonomic support may contribute to musculoskeletal discomfort. Introducing physiotherapy support and ergonomic training may improve physical well-being.

Figure 6: Burnout vs. Coping Strategies

- **Interpretation:** Nurses actively practicing mindfulness and accessing peer support programs reported significantly lower burnout scores ($p = 0.002$). This supports the role of institutional mental well-being initiatives in reducing emotional exhaustion.

Figure 7: PTSD Symptoms vs. Emotional Role Impairment

- **Interpretation:** Nurses with severe emotional impairment had a notably higher PTSD prevalence. This emphasizes the need for psychological first-aid strategies in high-acuity units.

Figure 8: MBI-Depersonalization vs. Shift Duration

- **Interpretation:** Staff working shifts of 12 hours or more had significantly higher depersonalization scores ($p = 0.003$), highlighting the need for better shift duration management.

Figure 9: Role Emotional Impairment vs. Age

- **Interpretation:** Emotional impairment was disproportionately higher in staff aged <30 years. This highlights the vulnerability of younger staff to emotional strain, emphasizing the need for mentorship programs.

Figure 10: Burnout vs. Years in ICU Practice

- **Interpretation:** Nurses with 2-5 years of ICU experience reported moderate burnout levels,

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reflecting a cumulative effect of workplace stress.

Figure 11: Social Support Utilization vs. Job Satisfaction

- **Interpretation: Nurses who reported greater utilization of social support had significantly higher job satisfaction scores ($p < 0.01$), emphasizing the importance of structured peer support.**

Figure 12: PTSD Prevalence by ICU Role

- **Interpretation:** Supervisory staff reported fewer PTSD symptoms than frontline staff, suggesting improved resilience from leadership experience and additional training.

Figure 13: Work Satisfaction vs. Fixed vs. Rotating Shifts

- **Interpretation:** Fixed-shift staff reported higher job satisfaction levels, reinforcing the impact of predictable schedules in promoting work-life balance.

Implications for Practice:

- **Physical Well-being Strategies:** Encouraging ergonomic practices, designated rest areas, and structured physical activity breaks can enhance PF scores.
- **Emotional Support Systems:** Establishing structured debriefings, counselling services, and trauma-informed care models may reduce emotional strain and improve GH outcomes.

Strengths and Limitations

Strengths:

1. Robust Methodology: The combination of quantitative SF-36 and MBI data with qualitative thematic interviews ensures a comprehensive assessment of ICU nurse well-being.
2. Diverse Data Analysis: Use of correlation analysis, ANOVA, and multivariate regression enhances result accuracy and highlights significant associations.
3. Clinical Relevance: The study identifies actionable strategies such as mentorship, structured debriefings, and fixed shift patterns that can be implemented in ICU settings.
4. Focused Recommendations: The tailored policy recommendations provide practical steps for ICU leadership to improve nurse well-being and reduce burnout risk.

Limitations:

1. Single-Centre Study: The results may have limited generalizability as the study was conducted in a single tertiary care ICU setting.
2. Sample Size: While adequate for correlation analysis, a larger sample across multiple ICUs would strengthen generalizability.
3. Potential Recall Bias: Self-reported data may have introduced recall bias when assessing emotional strain and coping strategies.
4. Short-Term Data Collection: As the study lacks longitudinal follow-up, the sustainability of recommended interventions remains unknown.

Conclusion

This study provides a comprehensive assessment of the psychological, physical, and social well-being of ICU nurses. The significant associations between emotional role impairment, burnout, and PTSD underscore the urgent need for institution-driven interventions.

To support ICU staff well-being, we should focus on practical strategies like mentorship programs for junior staff, structured debriefings after shifts, and better shift management. Strengthening peer support networks, incorporating mindfulness training, and making ergonomic improvements can also help build both physical and emotional resilience.

From a policy standpoint, healthcare institutions need to prioritize mental health by offering accessible counselling, mindfulness programs, and real-time peer debriefing sessions. At a regional level, standardized mental health protocols for ICU teams should be established to ensure consistency and effectiveness. On a national scale, reforms are needed to maintain sustainable nurse-to-patient ratios, improve scheduling systems, and create strong crisis support frameworks to protect ICU workers from burnout.

Looking ahead, research should explore personalized mental health interventions that consider cultural, institutional, and individual differences in how ICU staff cope with stress. Long-term studies are also essential to evaluate the effectiveness of these

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strategies in reducing burnout and improving staff retention over time.

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