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Analysis of Workload and Occupational Safety Risks for Healthcare Workers Post-COVID-19 Pandemic: An Occupational Health and Safety (OHS) Approach

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ABSTRACT

***Purpose**: This study aims to analyze the workload and occupational health and safety (OHS) risks experienced by healthcare workers in the post-COVID-19 pandemic era and to examine the role of organizational support in mitigating these risks.*

***Subjects and Methods:** This study employed a qualitative research design involving 10 healthcare workers, including nurses and medical staff, who were actively working in healthcare facilities after the pandemic period. Participants were selected using purposive sampling to ensure relevant experience related to workload and occupational safety issues. Data were collected through in-depth interviews and analyzed using thematic analysis, including data familiarization, coding, categorization, and theme development to identify key patterns related to workload conditions and occupational risks.*

***Results:** The findings indicate that healthcare workers continue to experience high workloads due to increased patient demand, delayed medical services during the pandemic, and shortages of healthcare personnel. These conditions often lead to overtime work, physical fatigue, and mental exhaustion. The study also found that healthcare workers face persistent occupational safety risks, including biological exposure to infectious diseases and ergonomic problems such as musculoskeletal strain. High workload and time pressure can reduce adherence to safety procedures, increasing the risk of workplace incidents. Organizational support, including adequate staffing, safety training, clear protocols, and balanced work schedules, was identified as an important factor in reducing these risks.*

***Conclusions:** Effective workload management and strengthened OHS systems are essential to protect healthcare workers and ensure sustainable healthcare services in the post-pandemic era.*

INTRODUCTION

The COVID-19 pandemic has placed unprecedented pressure on healthcare systems worldwide and significantly altered the working conditions of healthcare workers (Ardebili et al., 2021; Filip et al., 2022; Shuster & Lubben, 2022). During the pandemic, healthcare workers faced extremely high workloads, long working hours, limited human resources, and intense exposure to occupational risks, particularly biological risks from SARS-CoV-2 infection. Although many countries have entered the post-COVID-19 pandemic phase, the pandemic's impact on healthcare workers' working conditions and safety has not yet fully subsided. In fact, the post-pandemic

period has seen new challenges related to workload sustainability and occupational health and safety (OHS) risks that require serious attention.

Workload is a key determinant of healthcare workers' occupational health. Workload encompasses not only physical demands such as patient volume, work duration, and manual activities, but also mental and emotional demands, including complex clinical decision-making, time pressure, and moral responsibility for patient safety (Holden et al., 2011; Handoko & Irawan, 2025; Goudarzian et al., 2025). Various studies have shown that high workload is closely associated with fatigue, decreased performance, increased work errors, and the risk of workplace accidents and injuries (Bagheri et al. 2019; Sunaryo & Ratriwardhani, 2022). In the post-COVID-19 era, the workload of healthcare workers remains relatively high due to the backlog of delayed services during the pandemic, the increasing complexity of patient cases, and the reduction in the number of healthcare workers due to burnout and resignations during the global health crisis.

In addition to workload, healthcare workers also face various occupational safety and health risks. These risks are not limited to exposure to infectious diseases but also include physical, ergonomic, chemical, and psychosocial hazards. Musculoskeletal injuries from patient care, needlestick injuries, exposure to chemicals from disinfectants and medications, and occupational stress are common risks in healthcare environments (Rai et al., 2021; Mengistu & Tolera, 2020; Motaarefi et al., 2016). The COVID-19 pandemic exacerbated these conditions through the prolonged use of personal protective equipment (PPE), changes in work procedures, and increased psychological stress. Even in the post-pandemic period, psychosocial impacts such as chronic fatigue, anxiety, and burnout are still widely reported among healthcare workers (Zhou et al., 2022; Liang et al., 2023; Gil-Almagro et al., 2024; Sikaras et al., 2025).

From an occupational safety and health (OHS) perspective, workload and safety risks are closely interrelated. Excessive workloads can increase the likelihood of unsafe work practices, reduce compliance with safety procedures, and increase the risk of workplace accidents (Kaminski, 2001; Wachter & Yorio, 2014; Nahrgang et al., 2011). In healthcare facilities, crowded working conditions and time pressures often encourage healthcare workers to take shortcuts, such as ignoring ergonomic principles, suboptimal use of PPE, or reducing thoroughness in infection control procedures. The Job Demand–Resources (JD-R) model explains that high work demands, including workload, can drain workers' physical and psychological resources, increasing the risk of health and safety disorders if not balanced with adequate resources and organizational support.

The post-COVID-19 period also presents unique challenges in implementing OHS systems in the healthcare sector. During the pandemic, the primary focus of healthcare organizations was emergency response and infection control (Patel et al., 2021; Burton et al., 2023). However, the post-pandemic era requires a more systematic, preventative, and sustainable OHS approach. Healthcare organizations are required to balance service recovery efforts with workforce protection, ensuring that increased productivity does not compromise the safety and health of healthcare workers. Unfortunately, various studies indicate that OHS systems in the healthcare sector still tend to be reactive and have not fully integrated workload management aspects into the risk assessment process (Ramos et al., 2020; Glevitzky et al., 2025).

Therefore, analyzing the workload and occupational safety risks of healthcare workers in the post-pandemic period is crucial. A quantitative approach to OHS analysis allows for the measurement of workload indicators, such as working hours, patient-to-healthcare worker ratio, and workload perception, as well as safety risk indicators such as reported occupational accidents, fatigue, and health problems. This analysis can help identify the healthcare worker groups most at risk, objectively assess risk levels, and inform managerial decisions and OHS policies in healthcare facilities.

Furthermore, protecting healthcare workers is a global priority in the field of occupational health. International organizations such as the World Health Organization and the International Labour Organization emphasize that the safety and health of healthcare workers are prerequisites for a resilient healthcare system and optimal service quality. In the post-COVID-19 context, strengthening the occupational safety and health (OHS) system through workload management and safety risk mitigation is crucial not only for the well-being of healthcare workers but also for

the sustainability of the healthcare system as a whole. Based on this background, this study aims to analyze the workload and occupational safety and health risks of healthcare workers in the post-COVID-19 era using an occupational safety and health (OHS) approach. This analysis is expected to provide an empirical contribution to understanding post-pandemic OHS challenges and serve as the basis for strategic recommendations for improving healthcare worker protection in healthcare settings.

METHODOLOGY

Research Design

This study employed a qualitative research approach to explore the workload and occupational health and safety (OHS) risks experienced by healthcare workers in the post-COVID-19 pandemic era. A qualitative design was selected because it allows researchers to gain an in-depth understanding of healthcare workers' experiences, perceptions, and challenges related to workload and workplace safety. Through this approach, the study seeks to capture real conditions and contextual factors influencing occupational safety in healthcare settings.

Research Participants

The participants in this study consisted of healthcare workers who were actively working in healthcare facilities after the COVID-19 pandemic period. Participants included nurses, medical staff, and other healthcare personnel who were directly involved in patient care and healthcare service delivery. Informants were selected using purposive sampling to ensure that participants had relevant experience related to workload and occupational safety issues. In total, 10 healthcare workers participated in this study.

Data Analysis

The collected data were analyzed using thematic analysis. Interview transcripts were carefully reviewed to identify recurring patterns and themes related to workload and occupational safety risks. The analysis process involved several stages, including data familiarization, coding, categorization, and theme development. The identified themes were then interpreted to understand the relationship between workload, occupational safety risks, and organizational factors affecting healthcare workers in the post-pandemic period.

Research Ethics

This study ensured confidentiality and anonymity of all participants. Participants provided informed consent prior to the interviews, and all information obtained during the research process was used solely for academic purposes.

RESULTS AND DISCUSSION

Workload Conditions of Healthcare Workers After the COVID-19 Pandemic

The workload experienced by healthcare workers in the post-COVID-19 pandemic era remains a significant concern within healthcare systems. Although the emergency phase of the pandemic has gradually subsided, healthcare facilities continue to face operational pressures related to service recovery, increased patient demand, and the need to restore routine healthcare services that were previously disrupted. These conditions have created new challenges for healthcare workers who must balance service efficiency with patient safety and quality of care. In the post-pandemic context, healthcare workers are not only responsible for managing regular patient care but also for addressing the backlog of delayed medical services that accumulated during the pandemic period.

Many patients postponed routine examinations, chronic disease management, and elective medical procedures during COVID-19 restrictions. As healthcare services resume normal operations, healthcare workers must handle a surge in patient visits, which increases both the volume and intensity of their daily workload. In addition to the increase in patient numbers, the complexity of healthcare cases has also grown in the post-pandemic period. Many patients present with more advanced health conditions due to delayed treatment, requiring more comprehensive clinical attention and longer treatment processes. This situation increases the

cognitive and emotional demands on healthcare workers, as they must make timely clinical decisions while managing the pressure of high patient turnover.

Healthcare facilities in some regions continue to face limitations in human resources due to staff burnout, resignations, or workforce redistribution during the pandemic. As a result, existing healthcare workers are often required to perform multiple roles, extend working hours, or take on additional responsibilities beyond their usual duties. To better understand these conditions, interviews were conducted with healthcare workers to explore their experiences regarding workload in the post-COVID-19 period. The interview results indicate that healthcare workers continue to experience high workloads even after the COVID-19 pandemic has subsided. Several participants explained that patient numbers have increased due to the backlog of healthcare services that were postponed during the pandemic period.

One participant stated:

> *"Even though the pandemic situation has improved, our workload has not decreased. In fact, we now handle more patients because many treatments were delayed during COVID-19." (Participant 3)*

The interview findings highlight that the post-pandemic healthcare environment continues to place substantial demands on healthcare workers. The increase in patient numbers and the need to address delayed medical services contribute significantly to sustained high workload levels. These conditions can lead to physical fatigue, emotional stress, and decreased work efficiency if not properly managed.

Prolonged high workload may have implications for occupational safety and the quality of healthcare services. Excessive work demands can reduce healthcare workers' concentration, increase the risk of errors, and potentially affect their well-being. Therefore, effective workload management strategies and adequate organizational support are essential to ensure the sustainability of healthcare services and the protection of healthcare workers in the post-pandemic era.

One of the critical factors contributing to the increased workload of healthcare workers in the post-COVID-19 period is the shortage of healthcare personnel. During the pandemic, many healthcare workers experienced extreme physical and psychological pressure due to prolonged working hours, high exposure to infection risks, and demanding clinical responsibilities. As a result, some healthcare workers experienced burnout, while others decided to leave the profession or reduce their working hours, creating gaps in the healthcare workforce. In the post-pandemic phase, healthcare systems are still struggling to restore the balance between service demand and workforce capacity.

The number of available healthcare workers in many healthcare facilities has not fully recovered, while the demand for healthcare services continues to increase. This imbalance forces existing healthcare staff to handle a greater number of patients and responsibilities than before, often without proportional adjustments in staffing levels. Healthcare workers frequently need to work overtime, extend their shifts, or take on additional responsibilities to ensure that healthcare services continue to operate effectively. This situation not only increases physical fatigue but also creates additional psychological pressure, as healthcare workers must maintain service quality while managing limited resources. These challenges were also reflected in the experiences shared by the study participants.

Another participant highlighted that the shortage of healthcare staff contributes significantly to increased workload.

> *"We often work overtime because there are not enough staff members to handle all patients. Sometimes we work longer shifts to ensure that patient services continue." (Participant 6)*

These findings indicate that workforce shortages remain a significant challenge in the post-pandemic healthcare system, leading to prolonged working hours and increased workload among healthcare workers. Without adequate staffing and workforce management strategies, these

conditions may increase the risk of fatigue, stress, and reduced work performance among healthcare personnel.

Occupational Health and Safety Risks Faced by Healthcare Workers

Healthcare workers operate in environments that inherently involve various occupational health and safety (OHS) risks due to the nature of their work. In healthcare settings, workers are required to interact closely with patients, handle medical equipment, and perform clinical procedures that may expose them to biological, physical, and ergonomic hazards. Even in the post-COVID-19 pandemic period, these risks remain a critical concern because healthcare workers continue to be at the frontline of patient care and disease management.

Although the global emergency phase of COVID-19 has gradually subsided, the potential exposure to infectious diseases in healthcare facilities persists. Healthcare workers still encounter patients with various contagious illnesses, including respiratory infections, blood-borne diseases, and other communicable conditions. This continuous exposure increases the importance of maintaining strict occupational safety measures and infection prevention protocols within healthcare environments. The experiences of healthcare workers interviewed in this study illustrate how these biological risks remain part of their daily professional responsibilities.

One participant explained:

> *"We are still exposed to infection risks every day because we interact directly with patients. Even though COVID-19 cases have decreased, other infectious diseases remain a concern." (Participant 2)*

The interview findings indicate that biological hazards remain one of the dominant occupational risks faced by healthcare workers. Direct patient contact, medical procedures, and handling biological materials create continuous exposure to potential infections. Even though protective measures such as personal protective equipment (PPE) and infection control protocols are widely implemented, healthcare workers still perceive infection risk as an unavoidable part of their work. The persistence of biological risks highlights the need for consistent implementation of occupational safety and health programs in healthcare facilities. Adequate training, availability of protective equipment, and strict adherence to infection prevention procedures are essential to minimize these risks. Strengthening OHS management systems can help protect healthcare workers while ensuring that healthcare services continue to operate safely and effectively in the post-pandemic period.

Another participant mentioned ergonomic risks caused by repetitive work activities.

> *"Lifting patients and standing for long hours often cause back pain and physical fatigue. Sometimes we feel exhausted after a long shift." (Participant 7)*

These findings indicate that occupational safety risks in healthcare environments remain significant even after the pandemic.

Relationship Between Workload and Occupational Safety Risks

Workload is one of the critical factors that can influence the occupational safety of healthcare workers. In healthcare environments, workers are often required to perform multiple tasks simultaneously, manage time-sensitive clinical decisions, and maintain high levels of accuracy in patient care. These responsibilities demand sustained physical energy and mental concentration, which can become challenging when workload levels are excessively high. When healthcare workers are exposed to prolonged work pressure, their ability to maintain optimal performance and adhere to safety procedures may be affected. In the post-pandemic healthcare context, the intensity of work has increased due to the need to address the backlog of healthcare services while simultaneously maintaining routine patient care. Healthcare workers are frequently required to manage large numbers of patients within limited timeframes. This situation often creates time pressure, forcing healthcare workers to complete tasks quickly in order to meet service demands. Under such conditions, attention to occupational safety procedures may be unintentionally reduced.

Fatigue resulting from long working hours and heavy workloads also contributes to decreased alertness among healthcare workers. Physical exhaustion and mental fatigue can impair cognitive function, reduce concentration, and increase the likelihood of errors in clinical practice. In high-risk environments such as hospitals and healthcare facilities, even small mistakes can potentially lead to occupational accidents or compromise patient safety. In addition, the need to maintain efficiency in healthcare services often places healthcare workers in situations where they must balance productivity with safety practices. When workloads exceed manageable levels, healthcare workers may experience difficulties in consistently following safety protocols. The experiences shared by participants in this study illustrate how excessive workload can influence workplace safety in healthcare settings.

Interview results show that high workload can increase the likelihood of occupational safety incidents. Participants explained that fatigue and time pressure may reduce attention to safety procedures.

One healthcare worker stated:

> *"When the workload is too high, sometimes we rush to complete tasks. In those situations, the risk of making mistakes or accidents becomes higher." (Participant 4)*

These findings indicate that excessive workload can create conditions where healthcare workers are more vulnerable to occupational safety risks. Time pressure and fatigue may lead workers to prioritize task completion over strict adherence to safety procedures, which increases the possibility of workplace incidents. The relationship between workload and occupational safety risks highlights the importance of effective workload management within healthcare organizations. Ensuring adequate staffing, providing sufficient rest periods, and implementing supportive workplace policies can help reduce fatigue and maintain healthcare workers' attention to safety practices, ultimately improving both worker protection and patient safety. Another participant emphasized that mental exhaustion also affects safety performance.

> *"When we are mentally tired, it becomes difficult to concentrate. This can increase the possibility of work errors." (Participant 8)*

These findings highlight that workload plays an important role in influencing the safety of healthcare workers.

Role of Organizational Support in Reducing OHS Risks

Organizational support plays a crucial role in ensuring the occupational health and safety of healthcare workers. In healthcare environments that involve high levels of risk and workload, the presence of supportive organizational policies and management practices can significantly influence how healthcare workers cope with work demands and safety challenges. Healthcare institutions are responsible for creating a work environment that prioritizes safety, provides adequate resources, and supports healthcare workers in performing their duties effectively. In the post-COVID-19 period, the role of healthcare organizations has become even more important as healthcare systems attempt to recover from the pressures experienced during the pandemic. Healthcare workers are expected to manage increasing service demands while maintaining strict safety standards.

In this situation, organizational support such as adequate staffing, clear operational procedures, safety training, and access to personal protective equipment (PPE) becomes essential in reducing the risk of occupational incidents. Effective occupational health and safety (OHS) management systems can help healthcare workers maintain safe work practices despite high workloads. Organizations that actively implement safety protocols, provide continuous training, and encourage communication regarding workplace risks are more likely to create a safety-oriented culture. Such organizational practices can strengthen healthcare workers' confidence and ability to manage workplace hazards. Participants emphasized the importance of organizational support in managing workload and reducing occupational risks. Adequate staffing, clear safety protocols, and access to personal protective equipment were identified as important factors.

One participant explained:

"Training and safety protocols help us reduce risks. When the hospital provides adequate support, it becomes easier for us to work safely." (Participant 1)

These findings indicate that strong organizational support and well-implemented OHS systems can play a significant role in reducing occupational risks among healthcare workers, particularly in high-demand healthcare environments during the post-pandemic period. Another-participant highlighted the importance of work schedule management.

"Fair work schedules and adequate rest time are important to prevent fatigue and burnout." (Participant 5)

These interview findings highlight that effective work schedule management is a critical component of occupational health and safety within healthcare organizations. Fair and balanced work schedules allow healthcare workers to maintain adequate rest periods, which are essential for physical recovery and mental well-being. Without proper scheduling systems, healthcare workers may experience prolonged fatigue due to long shifts and insufficient rest time, which can negatively affect both their health and their ability to perform clinical tasks safely.

Adequate rest periods also contribute to maintaining concentration, decision-making capacity, and emotional stability among healthcare workers. In healthcare environments where workers must make rapid and accurate clinical decisions, physical and mental fatigue can significantly increase the risk of errors and workplace incidents. Therefore, organizational policies that regulate working hours, shift rotation, and rest breaks play an important role in maintaining a safe and productive work environment.

The findings suggest that organizational commitment to occupational health and safety extends beyond the provision of equipment and safety protocols. It also involves the implementation of supportive human resource management practices, including fair workload distribution and sustainable work scheduling. By ensuring balanced work schedules and sufficient recovery time, healthcare institutions can reduce the risk of fatigue, burnout, and occupational accidents, thereby enhancing both healthcare worker well-being and the overall quality of healthcare services.

Discussion

Post-Pandemic Healthcare Workload Dynamics

The findings of this study demonstrate that the transition from the pandemic emergency phase to the recovery period has not necessarily reduced the workload experienced by healthcare workers. Instead, healthcare systems are currently facing a period of operational adjustment in which service demand is rapidly increasing (Niaz & Nwagwu, 2023). Healthcare facilities must simultaneously restore routine medical services, address delayed treatments, and maintain high standards of patient care. These conditions create a complex work environment in which healthcare workers are required to manage multiple responsibilities within limited timeframes.

From an organizational perspective, this situation reflects a structural challenge in healthcare workforce management. The imbalance between service demand and workforce availability forces healthcare workers to operate under sustained pressure. Increased patient inflow and the complexity of untreated or delayed medical cases require additional time, attention, and clinical judgment. As a result, healthcare workers must exert greater physical and mental effort in their daily tasks, which contributes to cumulative fatigue and work strain.

These conditions also highlight the importance of sustainable workforce planning in healthcare systems. Without strategic workforce management, healthcare facilities may experience prolonged periods of workforce overload. Such conditions not only affect healthcare workers' well-being but may also influence the overall performance of healthcare services. Therefore, addressing workload issues requires coordinated efforts involving workforce planning, service prioritization, and effective distribution of clinical responsibilities.

Persistence of Occupational Health and Safety Risks

The results of this study also indicate that occupational health and safety risks remain prevalent in healthcare environments despite the decline of COVID-19 as a global emergency. Healthcare workers continue to face exposure to biological hazards due to their constant interaction with patients and medical materials (Soares et al., 2020). In addition to biological risks, ergonomic challenges such as repetitive movements, prolonged standing, and manual patient handling contribute to physical strain and musculoskeletal problems.

These risks illustrate that healthcare work inherently involves a range of occupational hazards that extend beyond infectious disease exposure. While the pandemic highlighted biological safety concerns, the broader spectrum of workplace hazards continues to affect healthcare workers in daily practice. Repetitive clinical activities, demanding work environments, and long working hours can accumulate over time, creating physical and psychological stress.

The persistence of these risks emphasizes the importance of strengthening preventive safety strategies within healthcare institutions. Comprehensive occupational health and safety programs should include regular training, ergonomic workplace design, and continuous monitoring of workplace hazards. By addressing these risk factors proactively, healthcare organizations can reduce potential injuries and improve the long-term well-being of healthcare professionals.

Interaction Between Workload and Safety Performance

Another key finding of this study is the close relationship between excessive workload and the increased likelihood of occupational safety incidents. High work intensity often results in physical fatigue and mental exhaustion, which may affect healthcare workers' ability to maintain attention and accuracy during clinical procedures. In healthcare settings where tasks frequently involve critical decisions and precise actions, decreased concentration can increase the probability of errors. Workload pressure may also create time constraints that encourage workers to prioritize task completion over strict adherence to safety procedures (Gershon et al., 2000). Under such conditions, healthcare workers may unintentionally overlook certain safety protocols or reduce the thoroughness of clinical processes. Although these adjustments are often made in an effort to maintain service efficiency, they may increase the risk of occupational incidents or compromise patient safety. These findings highlight that occupational safety is closely linked to working conditions rather than solely individual performance. Effective workload management therefore becomes an essential component of workplace safety. Strategies such as balanced task allocation, adequate staffing levels, and sufficient rest periods can help reduce fatigue and support safer work practices among healthcare workers.

Organizational Support and Safety System Strengthening

The results further emphasize the important role of organizational support in mitigating occupational health and safety risks. Healthcare organizations serve as the primary environment where policies, resources, and management practices shape the daily experiences of healthcare workers. When healthcare institutions provide clear operational guidelines, appropriate safety training, and adequate protective equipment, healthcare workers are better equipped to manage occupational risks. In addition to material resources, organizational culture also plays a critical role in shaping workplace safety. A safety-oriented organizational culture encourages healthcare workers to follow established protocols, communicate potential hazards, and actively participate in safety improvement initiatives (Tsamasiotis et al., 2024). Such an environment promotes shared responsibility for safety among both management and staff.

Another important aspect of organizational support identified in this study is effective work schedule management. Balanced shift arrangements and sufficient recovery time allow healthcare workers to maintain physical and mental stability. Adequate rest not only improves personal well-being but also enhances cognitive performance, enabling healthcare workers to carry out clinical responsibilities more safely and efficiently. According to Cooklin et al. (2017), the discussion highlights that improving occupational health and safety in healthcare settings requires an integrated approach. Efforts to reduce workplace risks should involve not only individual awareness but also organizational commitment to supportive policies, sustainable workforce management, and continuous improvement of safety systems (Raja & Iqbal, 2019;

Mixafenti et al., 2025; Camuffo et al., 2017; Kineber et al., 2023). Through these coordinated strategies, healthcare institutions can create safer working environments while maintaining high-quality healthcare services in the post-pandemic era.

CONCLUSION

This study concludes that healthcare workers continue to experience significant workload pressures in the post-COVID-19 pandemic period due to increased patient demand, the accumulation of delayed medical services, and persistent shortages of healthcare personnel. The findings indicate that these conditions contribute to physical fatigue, mental exhaustion, and increased occupational health and safety (OHS) risks, including biological exposure, ergonomic strain, and the potential for workplace accidents. Excessive workload and time pressure can reduce healthcare workers' concentration and adherence to safety procedures, thereby increasing the likelihood of errors and occupational incidents. However, the study also highlights that strong organizational support such as adequate staffing, effective work schedule management, clear safety protocols, continuous training, and access to personal protective equipment plays a crucial role in mitigating these risks. Therefore, sustainable workforce planning, balanced workload distribution, and strengthened OHS management systems are essential to protect healthcare workers' well-being and to ensure the continuity and quality of healthcare services in the post-pandemic era.

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