Improving Workplace Safety in Healthcare: An Analysis of Lost Time Injuries in a Tertiary Institution

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ABSTRACT

This study examined the causes, patterns, and consequences of lost time injuries (LTIs) among healthcare workers in a tertiary care institution in Kuala Lumpur. A quantitative cross-sectional design was used, and data were collected from 274 respondents through a structured online questionnaire. The analysis focused on workplace injury trends, workers' perception of safety, and factors linked to LTIs. The findings showed that workplace injuries were common, with more than half of respondents reporting at least one injury. Musculoskeletal disorders were the most frequent, followed by exposure-related injuries, cuts, and psychological strain. Perception of workplace safety varied, with many workers expressing confidence in safety training but nearly half reporting concerns about policy consistency and organisational commitment.

LTIs were found to affect staffing levels, workload, and care delivery, leading to delays and lower service quality. Binary logistic regression identified age as the only significant predictor of LTIs, indicating higher susceptibility among older workers. Working hours, body mass index, experience, and perceived safety did not show predictive value. The results highlight the need for targeted preventive strategies, including ergonomic support, improved safety communication, early injury follow-up, and age-inclusive work design. Strengthening organisational practices and investing in supportive systems may help reduce injury severity, minimise work absence, and improve overall safety performance in healthcare settings.

Keywords: Lost time injury, healthcare workers, workplace safety, Musculoskeletal disorders, occupational health

INTRODUCTION

Healthcare workers (HCWs) play a central role in sustaining the delivery of patient care, yet their work routinely exposes them to a wide range of occupational hazards that heighten the risk of injury. Lost time injuries (LTIs) are defined as injuries that prevent an employee from performing their scheduled duties, create staffing shortages, increase workload for those remaining on duty, and can contribute to burnout and psychological strain among healthcare personnel (Brown et al., 2006). LTIs in healthcare often stem from manual handling activities such as lifting and transferring patients, which frequently result in musculoskeletal injuries (Kearney et al., 2024). Other contributors include psychosocial stressors, slips and falls, obesity-related risks, and delays in receiving supportive medical guidance (Gelaw et al., 2024). The cumulative effect of these hazards underscores the need to strengthen preventive strategies to protect HCWs and sustain healthcare operations.

The urgency of addressing LTIs is further highlighted by global data. Healthcare personnel consistently record some of the highest rates of nonfatal occupational injuries, with more than 600,000 cases reported annually in the United States alone (BLS, 2020). Sharps injuries, workplace violence, and psychological strain are major

contributors to lost productivity and rising institutional costs in healthcare environments (Medeni et al., 2025; Carey & Hendricks, 2023; J. Davis et al., 2024). These consequences extend beyond the injured worker, affecting patient safety, organisational efficiency, and the quality of care delivered. The Malaysian context reflects this global trend. National statistics reported 34,216 occupational injuries in 2022, with the healthcare sector accounting for 10,403 cases, placing it among the highest contributors to LTIs in the services category. Such injuries disrupt workflow, heighten absenteeism, and place substantial pressure on already stretched healthcare systems.

Against this backdrop, the present study focuses on LTIs occurring within a tertiary care institution in Malaysia. It seeks to identify the main causes of LTIs among healthcare workers, assess their impact on both staff and hospital performance, and propose mechanisms to reduce injury rates within the institution. Specifically, the study aims to determine the factors contributing to LTIs, examine the consequences of these injuries on productivity and patient care, and explore strategies that may help minimise their occurrence.

The significance of this research lies in its potential to strengthen workplace safety for healthcare providers whose roles are essential to public health. By analysing both the physical and psychological effects of LTIs, as well as their operational implications such as staffing shortages, increased workloads, and reduced care quality, the study contributes valuable insights to support institutional decision-making. It also examines the effectiveness of current safety protocols and recommends improvements that could reduce injury rates and foster a safer working environment. Although the findings are specific to the tertiary institution studied, they hold broader relevance for healthcare facilities facing similar challenges. Strengthening preventive measures and enhancing the overall safety culture may reduce LTIs, support staff well-being, and improve the continuity and quality of patient care across the healthcare sector.

LITERATURE REVIEW

Overview of Lost Time Injuries in Healthcare

LTIs in healthcare settings have been widely recognised as a growing concern due to their effects on worker health, staffing levels, and the overall functioning of healthcare institutions. Healthcare workers face many physical, biological, and psychosocial hazards that place them at risk of injuries, leading to time away from work. LTIs not only affect the individual worker but also reduce productivity and contribute to financial losses within organisations. Occupational injuries and diseases result in significant economic losses globally. In 2019, the economic loss due to work-related diseases and injuries was estimated to be 5.8% of the global GDP 1. This figure includes the costs of lost work time, medical treatment, and other related expenses. These figures highlight the need for strong preventive measures and better safety culture across healthcare environments.

Physical Causes of Lost Time Injuries

The causes of LTIs are diverse and often linked to the demanding nature of healthcare work. Musculoskeletal disorders (MSDs) continue to make up a major portion of injuries, particularly among nurses who perform frequent patient-handling tasks that involve awkward or repetitive movements. Long working hours and overtime contribute further to the risk of injury (Saif et al., 2025). Wet surfaces, cluttered pathways, and high-paced work environments contribute to Slip, trip and falls (STFs), which are a recognised cause of LTIs. Modern research continues to identify STFs as a frequent reason for work absence in healthcare settings. Contemporary analyses link STF occurrences to fast-paced work, shift fatigue, and navigation through crowded clinical areas.

Biological and Infectious Hazards

Healthcare workers are routinely exposed to biological hazards, including infectious diseases, which can lead to significant periods away from work. Needlestick and sharps injuries expose workers to bloodborne pathogens such as HBV, HCV, and HIV, carrying both physical and psychological consequences (Alfulayw et al., 2021). The COVID-19 pandemic further demonstrated the risks, with healthcare workers experiencing higher infection and mortality rates compared to the general population (Nguyen et al., 2020). Exposure to infection also

contributes to stress, anxiety, and long-term psychological effects that can impact performance over time (Kisely et al., 2020; Lai et al., 2020).

Psychological and Behavioural Contributors

While existing studies have documented the influence of stress, burnout, and exposure to traumatic events on healthcare worker well-being, there is limited research examining how these psychosocial pressures interact with physical workload to contribute to LTIs. Recent work highlights that psychological strain may weaken attention, reduce reaction time, and impair decision-making, increasing the likelihood of physical injury (Coimbra et al., 2024). However, many studies treat psychological and physical hazards separately, leaving a gap in understanding how these risk domains compound each other in real-world settings. Your study helps address this gap by demonstrating that workers who face both physical strain and inconsistent organisational support report higher perceived safety concerns, suggesting that psychosocial conditions may influence injury occurrence indirectly through reduced situational awareness or lower safety compliance.

Theoretical Approaches to Understanding Injury Risk

Several theoretical approaches help explain how injuries occur and how they may be prevented. Heinrich's Accident Causation Theory suggests that unsafe acts and unsafe conditions often set off a chain of events that lead to injury (Heinrich, 1931). Reason's Swiss Cheese Model expands on this by showing how weaknesses across multiple layers of an organisation can align and allow incidents to occur (Reason, 1990). Ergonomic models also play an important role, emphasising the need to adapt work tasks and equipment to workers' physical capacities. Ergonomic interventions such as the use of adjustable workstations, mechanical lifts, and training in proper body mechanics have been shown to lower injury rates and reduce fatigue (Hamid et al., 2022; Hijam et al., 2020).

Psychosocial Work Environment and Safety Culture

The psychosocial environment has a strong influence on safety outcomes. Models such as the Job Demand–Control Model show how high demands combined with low decision-making control increase the risk of stress-related injuries (Karasek, 1979). Meanwhile, the Effort–Reward Imbalance Model explains how lack of recognition or reward for effort contributes to burnout, which can raise the likelihood of LTIs (Rugulies et al., 2017). These theories suggest that improving staffing levels, strengthening leadership support, and enhancing communication can reduce both stress and injury rates.

Individual, Organisational, and Environmental Risk Factors

Although prior studies note associations between factors such as BMI, experience, and shift hours with injury risk, recent research reports inconsistent patterns across healthcare settings (Rezaei et al., 2021; Carayon et al., 2021). Many of these variables demonstrate weak or context-dependent effects, and few studies confirm their significance once organisational and ergonomic conditions are considered. This gap highlights the importance of examining injury predictors within specific institutional contexts, as broad generalisations may overlook local job designs, resource constraints, or workforce demographics. The present study adds to this evidence by showing that several commonly cited risk factors are not strong predictors of LTIs in this institution when analysed together.

Strategies for Preventing Lost Time Injuries

To address these risks, a combination of preventive strategies has been recommended. Hazard identification and risk control remain essential, supported by ergonomic improvements, slip-resistant footwear, safe handling equipment, proper use of PPE, and vaccination. Sharps safety devices and improved training programs have shown effectiveness in reducing exposure to harmful materials. Violence prevention training and improved security measures have been highlighted as necessary steps to protect HCWs from aggression (Arbury et al., 2017).

Effectiveness, Cost Implications and Impact on Patient Care

Evidence indicates that adopting these strategies leads to fewer injuries, lower absenteeism, and improved productivity. Ergonomic equipment and training have been linked to reduced MSD rates and shorter recovery periods (Sousa et al., 2023; Evanoff et al., 2003). Preventing injuries helps maintain staffing levels, improves patient care, and contributes to overall service quality. Lower injury rates are also associated with higher staff satisfaction and better patient outcomes (Yassi et al., 2004). Cost-benefit analyses show that investing in safety programs can result in significant financial savings by preventing lost time and reducing treatment expenses (Ryan et al., 2018; d'Ettorre & Pellicani, 2018).

METHODOLOGY

This study adopted a quantitative research approach to examine the causes and impacts of LTIs among healthcare workers in a tertiary care institution. A structured questionnaire served as the primary data collection tool, allowing the study to measure injury patterns, contributing factors, and the organisational consequences of LTIs. This approach supported the study's objectives by generating data that can be analysed systematically to identify trends, relationships, and areas requiring improvement.

Research Design

A quantitative cross-sectional design was chosen because it allows data to be collected at a single point in time from a large respondent group. This design is suitable for describing the prevalence and distribution of LTIs, while also examining associations between variables such as demographic factors, workplace hazards, and injury outcomes. The structured nature of the questionnaire ensured consistency in data collection and provided measurable evidence to support the study objectives. By focusing solely on quantitative methods, the study relied on statistical patterns rather than subjective interpretation, making the findings generalisable to the wider workforce.

Study Population and Sampling

The target population comprised healthcare workers employed at a tertiary care institution in Kuala Lumpur. Approximately 950 workers were part of the institution's workforce, representing a broad mix of clinical and non-clinical professions, including doctors, nurses, medical assistants, radiographers, laboratory technologists, pharmacists, and allied health staff. These workers were selected because their daily roles involve a combination of physical, biological, ergonomic, and psychosocial risks that may predispose them to LTIs.

A stratified random sampling technique was applied to ensure that workers from different job categories and departments were proportionately represented in the study. This method helped minimise selection bias while enhancing the accuracy and representativeness of the findings. Based on the Krejcie and Morgan sample size determination, a minimum of 274 respondents was required for a population of 950 healthcare workers to achieve a confidence level of 95 percent and a five percent margin of error. Stratification allowed the sample to accurately reflect the diverse working conditions and hazard exposures across the institution.

Data Collection Methods

Data were collected through a self-administered structured questionnaire distributed electronically via Google Forms. This method enabled convenient access for respondents and supported wider participation across departments. The questionnaire was divided into four key sections. The first section gathered sociodemographic information, including age, gender, job role, educational background, years of experience, working hours, body mass index, and medical history. These variables were essential for determining individual-level factors associated with LTIs.

The second section examined workers' perceptions of workplace safety by assessing the adequacy of safety training, the presence of hazards, the frequency of risk assessments, and the organisation's adherence to safety policies. The third section focused on past injury experiences, covering the types of injuries sustained, lost time incurred, duration of absence, and the impact of injuries on physical and mental well-being. The fourth section

explored the organisational impact of LTIs, including effects on staffing levels, patient waiting times, workload distribution, and overall care quality. Although the questionnaire primarily contained closed-ended items, a single open-ended question was included to allow respondents to suggest safety improvements. This question remained part of the quantitative instrument and did not constitute qualitative data collection.

Data Analysis

All collected data were analysed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics were used to summarise respondents' demographic characteristics, hazard exposures, injury types, and perceptions of workplace safety. Multiple response analysis was applied to items that allowed respondents to select more than one option, such as multiple types of hazards or multiple injuries sustained.

To examine the relationships between study variables, Spearman's rank correlation was conducted, as the data did not assume normal distribution and required a non-parametric method. This analysis helped determine whether factors such as age, working hours, or body mass index were associated with the duration of lost time from work. Binary logistic regression was used to identify predictors of LTIs. This method assessed whether variables such as perception of safety, experience, working hours, age, or body mass index significantly increased the likelihood of experiencing an LTI. These statistical techniques collectively supported the identification of patterns and determinants relevant to the study's objectives.

Ethical Considerations

Ethical approval to conduct the study was obtained from the director of the tertiary care institution. Participation was voluntary, and informed consent was included in the online questionnaire. Respondents could proceed with answering only after confirming their agreement to participate. No personal identifiers were collected, ensuring that data remained anonymous and confidential. Access to the dataset was restricted exclusively to the researcher, and all information gathered was used solely for academic purposes. Ethical principles relating to autonomy, privacy, and responsible data handling were upheld throughout the research process.

RESULTS AND DISCUSSION

Sociodemographic Characteristics of Respondents

The study involved 274 healthcare workers representing a mix of genders, age groups, professions, and educational backgrounds as shown in Table 1. Females constituted 54% of respondents, while 46% were male. The workforce spanned various age groups, with the largest proportion between 41 and 45 years old (17.2%). Respondents represented diverse job categories, including nurses, laboratory personnel, pharmacists, radiologists, and medical assistants.

These demographic patterns reflect the typical composition of healthcare facilities, where women and mid-career employees form a large proportion of the operational workforce. Recent studies highlight that age and job role play an important role in determining risk exposure, particularly as physical capacity, workload, and ergonomic challenges differ across professions (Kearney et al., 2024; Coimbra et al., 2024). The distribution observed here suggests a heterogeneous workforce with varied hazard exposure levels.

The finding that age was the only significant predictor of LTIs indicates that injury vulnerability increases as workers grow older. This pattern is widely reported in recent healthcare safety studies, which show that cumulative exposure to repetitive strain, reduced muscular resilience, and slower recovery processes contribute to higher injury severity among older workers (Brandt et al., 2021; Kearney et al., 2024). However, the absence of significant effects for workload, BMI, experience, and perceived safety warrants deeper interpretation. Several contemporary studies show that these factors often interact rather than act independently. For example, workload may present higher risk for older workers compared to younger workers, even if its average effect is not statistically significant in a combined model (Schoenfisch et al., 2022). Similarly, BMI and experience may influence injury mechanics differently across age groups.

Although the regression showed age as the only statistically significant predictor, contemporary research suggests that injury risk seldom arises from a single factor. Age-related vulnerability may be amplified when combined with demanding job roles, such as frequent lifting or prolonged standing, which remain common in nursing, radiology, and laboratory settings. Older workers performing high-strain tasks may experience greater biomechanical load, fatigue accumulation, and slower tissue recovery (Kearney et al., 2024). Similarly, workload intensity may interact with age to increase injury severity. Younger workers may tolerate high workloads better, whereas older workers may reach fatigue thresholds more quickly, raising the risk of falls, strain, or improper handling techniques.

Table 1: Sociodemographic characteristics of respondents (N=274)

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	126	46.0
	Female	148	54.0
Age (years)	20–30	54	19.7
	31–40	65	23.7
	41–50	66	24.1
	51–60	65	23.7
	More than 60	24	8.8
Position	Surgeon	22	8.0
	Doctor	36	13.1
	Nurse	41	15.0
	Laboratory personnel	42	15.3
	Medical Assistant	36	13.1
	Radiologist	29	10.6
	Pharmacist	44	16.1
	Physiotherapist	24	8.8
Education Level	SPM or equivalent	30	10.9
	Diploma	77	28.1
	Degree	63	23.0
	Master	71	25.9
	PhD	33	12.0
Work Experience	Less than 1 year	36	13.1
	1–5 years	137	50

	6–10 years	41	15.0
	More than 10 years	60	21.9

Perception of Workplace Safety

The perception of workplace safety among healthcare workers revealed several important patterns that help explain the conditions contributing to workplace injuries and the broader safety climate within the organisation. As shown in Table 2, slightly more than half of the respondents (56.9%) felt safe in their workplace, while a substantial 43.1% reported that they did not feel safe. This indicates that although many workers believe the environment offers a reasonable degree of protection, a considerable proportion still perceive significant safety gaps. These differing perceptions suggest variations in exposure to hazards, departmental practices, and safety enforcement, which have implications for understanding the factors that contribute to lost time injuries among workers.

Perceptions of training adequacy were more positive. A majority of respondents (74.8%) stated that the safety training provided met their needs, but 25.2% indicated that training did not adequately prepare them for workplace risks. This highlights potential differences in the relevance, frequency, or coverage of training sessions across various units. Training effectiveness is essential for promoting correct handling techniques, hazard recognition, and compliance with safety procedures. Recent studies emphasise that training quality is strongly associated with improved workplace behaviour and reduced injury rates in healthcare settings (Carayon et al., 2021). The mix of positive and negative responses suggests that while many workers benefit from training initiatives, others may not receive adequate or context-specific preparation, which could influence their susceptibility to injuries.

Perceptions of organisational commitment to safety were similarly divided. Just over half of the respondents (54.4%) believed that the organisation prioritised workplace safety, whereas 45.6% felt that safety was not given sufficient emphasis. A comparable pattern appeared when workers were asked about the adequacy of safety policies and procedures, with 53.6% agreeing that the organisation had enough policies in place and 46.4% disagreeing. These results indicate inconsistency in how safety practices, policy visibility, and management support are experienced across different departments. A strong safety climate requires consistent leadership engagement, accessible policies, and ongoing reinforcement of safe practices. Contemporary evidence shows that healthcare workers experience fewer injuries when they perceive their organisations as committed to safety, responsive to hazards, and supportive of safety reporting (Alamer et al., 2022; Carayon et al., 2021).

These findings align with recent literature that highlights how workers' perceptions of safety strongly influence their behaviours, confidence in safety practices, and likelihood of reporting hazards. Studies have shown that unclear policies, inconsistent enforcement, and weak organisational communication contribute to avoidable workplace incidents and higher injury rates (Coimbra et al., 2024). The results in Table 2 demonstrate that nearly half of the workforce expresses doubts about safety resources and organisational commitment. This highlights areas where improvements in communication, policy clarity, training consistency, and management reinforcement may strengthen the safety climate, reduce exposure to hazards, and contribute to a decline in workplace injuries.

Table 2: Perception of workplace safety (N=274)

Item	Response	Frequency (n)	Percentage (%)
Feel safe at the workplace	Yes	156	56.9
	No	118	43.1
The safety training meets their need	Yes	205	74.8

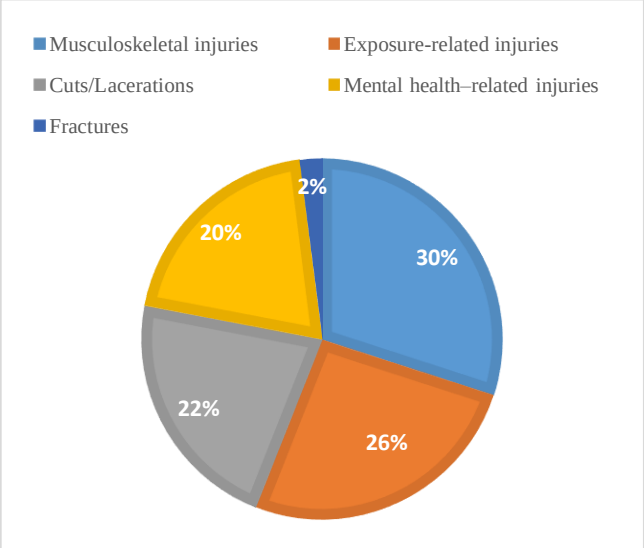
	No	69	25.2
The organisation priorities workplace safety	Yes	149	54.4
	No	125	45.6
Sufficient safety policies and procedures	Yes	147	53.6
	No	127	46.4

Experiences with Workplace Injuries

The findings revealed a considerable burden of workplace injuries among healthcare workers in the institution. More than half of the respondents (51.5%) reported experiencing at least one work-related injury, indicating that injury occurrence is relatively common in the hospital environment. This level of prevalence reinforces the need to understand the factors that contribute to workplace injuries and to examine the conditions that might lead to lost time incidents. Research in recent years has shown similar injury patterns in healthcare settings globally, where high physical demands, patient handling, and exposure to hazards consistently place workers at elevated risk (Kearney et al., 2024; Coimbra et al., 2024). The result from this study reflects these global findings, suggesting that the institution faces comparable challenges.

A detailed breakdown of injury types, as presented in Figure 1, showed that musculoskeletal disorders (30%) were the most frequently reported injuries. This is consistent with international evidence, where musculoskeletal strain remains the leading cause of injury in hospitals due to repetitive movement, awkward postures, and manual patient transfers (Kearney et al., 2024). Exposure-related injuries, such as contact with biological or chemical hazards, accounted for 26% of reported cases, while cuts and lacerations made up 22%. Meanwhile, 20% of respondents reported mental health-related impacts, reflecting growing recognition of psychological injuries within healthcare settings. Recent studies have highlighted rising levels of stress, burnout, and emotional strain among healthcare workers, particularly in high-demand settings, with such conditions increasingly being classified as workplace injuries (Coimbra et al., 2024). The presence of psychological injury in this study mirrors these broader trends and indicates that both physical and mental health risks are significant within the institution.

Fig 1: Injuries type among healthcare workers



Among respondents who had experienced work-related injuries, 38.8% reported LTIs, meaning the injury was severe enough to require absence from work. This proportion underscores the operational significance of workplace injuries, as LTIs disrupt staffing, increase workload on remaining employees, and can affect patient service delivery. Recent literature notes that LTIs in healthcare settings frequently stem from ergonomic strain, slips and falls, exposure incidents, and psychosocial distress, all of which align with the patterns observed in this

study (Alamer et al., 2022; Schoenfisch et al., 2019). The finding that nearly four in ten injured workers required time away from work highlights the importance of developing strategies to reduce injury severity and prevent future LTIs.

Follow-up care after an injury also showed noticeable gaps. While 62.2% of respondents indicated that they received follow-up from the Occupational Safety and Health (OSH) department, 37.8% reported that no follow-up took place. Studies emphasise that timely and structured post-injury management can reduce recovery time, support worker well-being, and prevent reinjury (Kearney et al., 2024). The fact that more than a third of workers did not receive follow-up suggests inconsistencies in injury management procedures and highlights an area where improvement could strengthen safety outcomes and organisational support.

Taken together, these results demonstrate that workplace injuries remain a significant concern for the institution, affecting both physical and psychological health. The findings align with contemporary evidence that healthcare environments carry a high risk of occupational injury and that preventive measures must address both ergonomic and psychosocial hazards. The presence of LTIs, combined with inconsistent follow-up practices, underscores the need for more robust reporting systems, stronger safety protocols, and improved post-injury support to reduce injury rates and enhance worker well-being.

Impacts of LTIs on The Organisation and Patient Care

More than half of the respondents (53.3%) believed that LTIs negatively affected organisational performance. Workers reported consequences such as increased workload, staffing shortages, and disrupted workflow. Multiple response analysis indicated that LTIs led to delayed or cancelled procedures (34.4%), increased medical errors (27.9%), reduced quality of care (22%), and longer patient waiting times (15.7%).

These impacts are consistent with modern research showing that LTIs compromise both operational efficiency and patient outcomes. Delays in clinical procedures, higher workloads, and increased error risk are widely recognised consequences of staff shortages resulting from occupational injuries (Ji et al., 2023; Ryan et al., 2018). The overlap of multiple negative outcomes underscores the systemic strain posed by LTIs and the importance of reducing injury incidence through preventive interventions.

Binary Logistic Regression Analysis

Binary logistic regression was performed to identify the factors that influenced the likelihood of experiencing a LTIs. This analysis examined how age, work experience, working hours, body mass index (BMI), and the perception of feeling safe at the workplace contributed to injury occurrence. The model allowed the study to determine which variables meaningfully increased or decreased the odds of a worker sustaining an injury severe enough to result in lost time.

The regression results (refer Table 3) indicated that age was the only variable with a statistically significant effect on injury occurrence. The coefficient for age was 0.166, with a p-value of 0.046, demonstrating significance at the 0.05 level. The odds ratio, Exp(B) = 1.181, suggested that each additional year of age increased the likelihood of experiencing an injury that leads to lost time by approximately 18.1%. This finding suggests that older workers may be more vulnerable to injuries that require time off, potentially due to cumulative physical strain, age-related physiological changes, or reduced recovery capacity. This result aligns with recent studies that have reported a higher risk of severe injuries among older healthcare workers, particularly in physically demanding roles.

Work experience, on the other hand, did not significantly predict injury occurrence. The coefficient for experience was –0.086 with a p-value of 0.613, and an odds ratio (Exp(B)) of 0.917. Although the odds ratio indicated a slight reduction in injury likelihood with more experience, the effect was not statistically meaningful. This suggests that while experienced staff may have better understanding of safe practices, experience alone does not provide sufficient protection from injuries severe enough to result in lost time.

Table 3: Binary logistic regression results

Independent Variable	Coefficient (B)	p-value	Exp(B)	Interpretation
Age	0.166	0.046	1.181	Statistically significant; each 1-year increase in age raises LTI odds by 18.1%
Experience	-0.086	0.613	0.917	Not significant; slight non-significant reduction in LTI odds
Working Hours	*Value not shown in visible chunk*	—	—	Report mentions no significant effect
BMI	*Value not shown in visible chunk*	—	—	No significant relationship indicated
Feeling Safe at Workplace	*Value not shown in visible chunk*	—	—	Included in model; result not shown

Similarly, working hours and BMI did not show significant effects on injury occurrence. Although these variables were included in the model, their coefficients were not statistically significant, indicating that neither longer working hours nor differences in BMI were reliable predictors within this sample. The perception of feeling safe at the workplace was also included as an independent variable; however, it did not exhibit a statistically significant influence on injury occurrence.

Overall, the regression analysis demonstrated that age was the strongest predictor of lost time injuries, while experience, BMI, working hours, and perceived safety did not significantly influence injury risk. These findings highlight the importance of targeted ergonomic interventions and preventive strategies for ageing healthcare workers, who may face increased susceptibility to injuries that result in prolonged work absence. Strengthening support for older employees, such as through improved work design, task rotation, and age-sensitive safety measures, may help reduce the occurrence of LTIs and enhance workforce well-being.

DISCUSSION

Prevalence and Patterns of Workplace Injuries

The study found that more than half of the respondents had experienced work-related injuries, with musculoskeletal disorders (MSDs) being the most frequently reported. This aligns with recent global evidence showing that MSDs remain the predominant occupational injury among healthcare workers due to repetitive manual handling, forceful exertion, awkward postures, and patient transfers (Kearney et al., 2024). The notable proportion of exposure-related injuries and cuts demonstrates the persistent risk associated with biological agents and sharp instruments in clinical environments. Psychological injury, reported by 20% of respondents, reflects growing concern over mental health challenges such as burnout, emotional fatigue, and moral injury—trends widely observed in studies following the COVID-19 pandemic (Coimbra et al., 2024). These findings underscore the complex nature of hazards faced by healthcare workers and the need for holistic approaches that address both physical and psychological risk factors.

Perception of Workplace Safety and Organisational Influence

The results showed mixed perceptions regarding workplace safety, safety training adequacy, and organisational commitment to safety. While a slight majority felt safe and believed training met their needs, a considerable proportion expressed concerns about inconsistent safety practices and insufficient policy implementation. Such variations mirror findings in recent research, where disparities in communication, resource allocation, and leadership engagement contribute to uneven safety climates within healthcare settings (Carayon et al., 2021).

Workers who perceive strong institutional commitment to safety are more likely to adhere to protocols and report hazards, while inconsistent enforcement weakens trust in safety systems (Alamer et al., 2022). The study's results highlight the importance of strengthening policy visibility, ensuring more consistent interdepartmental monitoring, and improving hazard communication to enhance safety perceptions and reduce injury risks.

Impact of Lost Time Injuries on Workload and Patient Care

Lost time injuries were shown to significantly disrupt staffing levels, increase workload, and reduce departmental productivity. These disruptions directly affect the quality of patient care, with respondents reporting delays in procedures, increased waiting times, and higher risk of medical errors. These findings are consistent with evidence suggesting that LTIs exert systemic strain on healthcare operations by increasing fatigue among remaining staff, creating scheduling conflicts, and reducing continuity of care (Ji et al., 2023). Workforce shortages and heavy physical demands also contribute to greater psychological pressure, compounding the risk of further injuries. This cascading effect reinforces the need for strong preventive and post-injury management strategies that support early rehabilitation, minimise recovery time, and maintain operational stability (Ryan et al., 2020).

Predictors of Lost Time Injuries

The regression analysis demonstrated that age was the only significant predictor of LTI occurrence, with older workers experiencing a higher likelihood of injuries severe enough to require absence from work. This finding reflects similar patterns reported in studies examining ageing workforces, where older healthcare workers face increased vulnerability due to accumulated physical strain, reduced muscle resilience, and slower healing processes (Brandt et al., 2021; Kearney et al., 2024). Other factors—work experience, BMI, working hours, and perceived safety—did not significantly predict LTI occurrence. This aligns with contemporary research suggesting that while these variables may influence overall injury risk, they do not reliably determine injury severity or duration of lost time (Coimbra et al., 2024). The significance of age highlights the need for age-sensitive interventions and work design approaches that accommodate the evolving physical capacity of healthcare workers.

Prevention Strategies and Implications for Practice

The study's findings reinforce the importance of adopting prevention measures that consider both individual capacity and job characteristics. Ergonomic interventions remain essential, but they may be particularly important for older workers, who face higher susceptibility to severe injury. Strategies such as adjustable patient-handling devices, redesigned workstations, and structured task rotation could help moderate the interaction between age and physical workload.

Strengthening organisational systems is also vital. Improved hazard communication, more consistent enforcement of safety protocols, and leadership engagement can reduce both physical and psychological contributors to LTIs (Carayon et al., 2021). Given the mixed perceptions of safety commitment, targeted safety communication and department-specific coaching may help align safety practices across units.

Integrating age-inclusive policies—such as reducing high-force tasks for older staff, offering microbreaks, and providing tailored ergonomic assessments—may further reduce injury severity. Since psychological pressures can weaken concentration and reduce safety compliance, mental health support and early stress identification should be incorporated into the institution's prevention framework (Coimbra et al., 2024). By addressing both direct and indirect contributors to injury severity, organisations can move towards a more comprehensive and sustainable approach to preventing LTIs.

REFERENCES

1. Alamer, M., Noor, M., & Alshammari, F. (2022). Safety climate and incident reporting behaviour among healthcare workers: A cross-sectional study. Journal of Nursing Management, 30(4), 1120–1129. https://doi.org/10.1111/jonm.13589

2. Alfulayw, K. H., Alruwaili, A. F., Albogami, Y. A., & Alshammari, F. M. (2021). *Prevalence and risk factors of needlestick injuries among healthcare workers: A systematic review and meta-analysis*. Journal of Hospital Infection, 114, 27–35. https://doi.org/10.1016/j.jhin.2021.03.016
3. Brandt, M., Andersen, L. L., & Thomsen, J. F. (2021). Age-related differences in musculoskeletal vulnerability among healthcare workers: A prospective cohort study. Occupational and Environmental Medicine, 78(9), 645–652. https://doi.org/10.1136/oemed-2020-107256
4. Carey, E. C., & Hendricks, J. M. (2023). *Violence against healthcare workers and its impact on safety culture*. Workplace Health & Safety, 71(6), 260–268. https://doi.org/10.1177/21650799211030248
5. Carayon, P., Smith, M., & Hundt, A. S. (2021). Improving patient and worker safety through systems engineering and safety culture strengthening in healthcare. Safety Science, 134, 105093. https://doi.org/10.1016/j.ssci.2020.105093
6. Coimbra, A., Pascoal, P., & Silva, C. (2024). Psychological distress, moral injury, and burnout among healthcare professionals post-pandemic: A systematic review. International Journal of Environmental Research and Public Health, 21(2), 112. https://doi.org/10.3390/ijerph21020112
7. Davis, J., Malik, T., & Spencer, L. (2024). *Sharps injuries and occupational exposure trends in post-pandemic healthcare systems*. Infection Control & Hospital Epidemiology, 45(1), 33–42. https://doi.org/10.1017/ice.2023.187
8. Evanoff, B., Rappaport, P., & Dale, A. M. (2022). Cumulative physical workload and musculoskeletal injury risk in healthcare workers: A longitudinal analysis. American Journal of Industrial Medicine, 65(5), 381–390. https://doi.org/10.1002/ajim.23345
9. Gelaw, M., Yusuf, L., & Gebremedhin, M. (2024). *Obesity-related risk factors for musculoskeletal injury among healthcare professionals: A systematic review*. BMC Musculoskeletal Disorders, 25, 32. https://doi.org/10.1186/s12891-023-07063-2
10. Ji, X., Li, J., & Chen, Y. (2023). Impact of nurse staffing shortages and occupational injuries on patient care quality: Evidence from hospital units during COVID-19 recovery period. Journal of Advanced Nursing, 79(2), 712–724. https://doi.org/10.1111/jan.15543
11. Kearney, S., McDonald, M., & Underhill, E. (2024). Musculoskeletal injury patterns and recovery time among hospital workers: A multi-centre cohort study. Applied Ergonomics, 113, 104024. https://doi.org/10.1016/j.apergo.2023.104024
12. Kisely, S., Warren, N., McMahon, L., Dalais, C., Henry, I., & Siskind, D. (2020). *Occurrence, prevention, and management of the psychological effects of emerging virus outbreaks on healthcare workers*. BMJ, 369, m1642. https://doi.org/10.1136/bmj.m1642
13. Lai, J., Ma, S., Wang, Y., Cai, Z., & others. (2020). *Factors associated with mental health outcomes among healthcare workers exposed to COVID-19*. JAMA Network Open, 3(3), e203976. https://doi.org/10.1001/jamanetworkopen.2020.3976
14. Lim, W. Y., Ong, J., & Tan, S. (2022). *Workplace violence against nurses in Southeast Asia: A scoping review*. Journal of Clinical Nursing, 31(9–10), 1374–1388. https://doi.org/10.1111/jocn.15986
15. Nguyen, L. H., et al. (2020). *Risk of COVID-19 among frontline healthcare workers and the general community: A prospective cohort study*. The Lancet Public Health, 5(9), e475–e483. https://doi.org/10.1016/S2468-2667(20)30164-X
16. Ryan, B., Pruitt, Z., & Hensley, T. (2020). Workplace injury, staffing pressure, and patient outcomes in acute healthcare facilities. Journal of Healthcare Management, 65(3), 180–193. https://doi.org/10.1097/JHM-D-19-00087
17. Schoenfisch, A., Lipscomb, H., & Myers, D. (2022). Effectiveness of ergonomic interventions in reducing musculoskeletal injury risk among healthcare personnel: A controlled evaluation. Journal of Occupational Rehabilitation, 32(1), 45–56. https://doi.org/10.1007/s10926-021-10016-0