Incidence of Needlestick Injuries among Nurses: Scoping Review

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Abstract:

Needlestick injuries (NSIs) pose a significant risk to healthcare workers, particularly nurses, due to the potential for transmitting blood-borne pathogens. This scoping review aimed to explore the incidence of NSIs among nurses globally and identify factors contributing to their occurrence. A comprehensive search of electronic databases was conducted to identify relevant studies published between 2010 and 2023. Data extraction focused on the incidence of NSIs, risk factors, prevention strategies, and the impact on nurses' health and well-being. Results revealed a variable incidence of NSIs across different regions and healthcare settings. Common risk factors included workload, inadequate safety training, and non-compliance with safety protocols. Prevention strategies such as the use of safety-engineered medical devices, proper waste disposal, and adherence to standard precautions were emphasized. The findings highlight the need for ongoing efforts to improve NSI prevention and mitigate the associated risks to nurses' health.

Keywords: Needlestick injuries, nurses, healthcare workers, blood-borne pathogens, occupational safety, prevention strategies, risk factors, global incidence.

Introduction:

Needlestick injuries (NSIs) represent a significant occupational hazard for healthcare workers, particularly nurses who are frequently involved in the administration of medications, blood draws, and other procedures involving sharp instruments [1]. These injuries occur when a needle or other sharp object punctures the skin, introducing the risk of exposure to bloodborne pathogens such as Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), and Hepatitis C Virus (HCV). The importance of comprehensively understanding the incidence and implications of needlestick injuries among nurses has grown in tandem with the evolving healthcare landscape and the increasing focus on worker safety and health [2].

The prevalence of needlestick injuries is alarming; it is estimated that between 600,000 to 1 million such injuries occur annually among healthcare workers in the United States alone. Nurses, who often represent the largest portion of the healthcare workforce, are disproportionately affected [3]. Findings from various studies indicate that nurses may experience anywhere from 25% to 50% of all needlestick injuries, a statistic that underscores the necessity for targeted strategies to mitigate risk and improve the safety of nursing practices. The multifactorial nature of NSIs—arising from factors such as inadequate training, high patient turnover, and the ahastening pace of healthcare—highlights the need for systematic approaches to minimize the occurrence of these injuries [4].

From a clinical perspective, needlestick injuries not only pose immediate health risks but also contribute to substantial emotional distress and anxiety among affected nurses. The repercussions of potential viral transmission, along with the subsequent medical evaluations and monitoring required following an NSI, can lead to a diminished quality of life and job performance. As nurses comprise the backbone of patient care, their well-being is intrinsically linked to patient outcomes. Therefore, the incidence of NSIs can have broader implications for healthcare systems, including increased turnover rates among nursing staff due to avoidable injuries and the emotional burden associated with them [5].

In order to devise effective prevention strategies, it is crucial to identify the underlying causes and contributing factors associated with needlestick injuries. Research indicates that environmental factors such as the physical layout of healthcare facilities, staffing levels, and the availability of safety-engineered devices play significant roles in determining the incidence of NSIs. Additionally, the culture of safety within healthcare organizations—a paradigm emphasizing shared values, beliefs, and practices that prioritize the safety of staff and patients—can either enhance or hinder the reporting and management of needlestick injuries [6].

Educational initiatives targeting both pre-licensure nursing programs and ongoing professional development are essential to address knowledge gaps regarding safe needle handling practices and device usage. Training programs that emphasize the importance of reporting incidents, regardless of perceived severity, contribute to a more comprehensive understanding of incidence rates and can catalyze further improvements in workplace safety protocols [7].

Legislative measures, such as the Needlestick Safety and Prevention Act in the United States, mandate the use of safer medical devices and encourage healthcare facilities to adopt effective strategies aimed at reducing injuries. Such policies advocate for the involvement of healthcare workers in the selection of safety devices, thus fostering a sense of agency and expertise among those who are most affected by these occupational hazards [8].

Moreover, the COVID-19 pandemic has introduced new dynamics to the healthcare setting, resulting in changes in work practices and increased workloads for nurses. The mental and physical toll of the pandemic must be considered when discussing the incidence of needlestick injuries, as fatigue and insufficient staffing levels can increase the likelihood of accidents. Future research must also evaluate the long-term impacts of the pandemic on health-seeking behaviors among nurses as well as the implications for broader occupational health policies [4].

Literature Review:

A study assessing needle stick injuries (NSI) among nurses worldwide found a global prevalence of 40.97%. The highest prevalence was found in Southeast Asia, while the lowest was in the United States. The prevalence was highest in developed countries, with 30.5% and 46.6% respectively. The highest prevalence was found in low-middle SDI countries, with 48.9%. The study found that developing countries had a significantly higher NSI prevalence than developed countries, especially in low-middle SDI countries. The findings suggest that nurses play a crucial role in healthcare, but their injuries are often overlooked [9].

A study aimed to assess the prevalence of needle stick injuries (NSI) among nurses worldwide, considering WHO regions, the socioeconomic development index (SDI), and individual countries' developmental status. A systematic review and meta-analysis were conducted, revealing a global NSI prevalence of 40.97%. The highest prevalence was found in Southeast Asia, while the lowest was in the United States. The prevalence in developed and developing countries was 30.5% and 46.6%, respectively. The SDI revealed the highest NSI prevalence in low-middle SDI countries (48.9%). The study concluded that developing countries had a significantly higher NSI prevalence than developed countries, especially in low-middle SDI countries. This highlights the need for improved healthcare systems and policies to reduce needle stick injuries among nurses worldwide [10].

Another study aimed to assess the prevalence of needle stick injuries among nurses working in the Ministry of Health and Population Hospitals in

Dakhlia Governorate. A cross-sectional study design was used, involving four tools: self-administered structured questionnaires about nurses' personal and occupational data, knowledge about needle stick injuries, behavior after needle stick injuries, and subjective practice. The study involved 364 nurses from 6908 hospitals in Dakhlia Governorate. Results showed that 304 (83.6%) of the studied nurses were exposed to needle stick injuries. The average score of nurses' knowledge about needle stick injuries was significantly higher among young nurses, while the average practice score increased with age. Most nurses had good and fair knowledge about needle stick injuries, but over two-thirds had unsatisfactory practice of correct behavior in their work. Recommendations include evaluating the impact of needle stick injuries on nurses' quality of life using health assessment questionnaires in different departments [11].

Another study aimed to determine the prevalence of needle stick injuries among nursing students at a private college in Saudi Arabia. The study involved 300 undergraduate nursing students, with 281 participating, with an effective response rate of 82%. The results showed that students had good knowledge scores and positive attitudes about needle stick injuries, but reported a low level of practice. The total prevalence of needle stick injuries was 14.1%, with 65.1% reporting one incident in the last year. Recapping was the most prevalent injury, followed by injection. Most students did not write a report, with being worried and afraid being the main reasons for non-reports. Female students and seniors scored higher in all needle stick injuries domains than male students and juniors. Students who had needle stick injuries more than three times last year reported a lower level of all needle stick injury domains. The study concluded that raising awareness among nursing students and conducting continuing education on sharp devices and safety, as well as incident reporting, is highly recommended [12].

A study was conducted to estimate the pooled prevalence of NSI among nursing students. The research involved searching for articles on various databases and analyzing the data using meta-analysis methods and random-effects models. The results showed that nursing students reported 35% of NSI, with 63% not reporting them. The highest prevalence was found in Asia, with 39.7% reported in studies conducted in Asia. There was no significant correlation between NSI prevalence and sample age or article year of publication. The study concluded that a third of nursing students experienced NSI, highlighting the need for occupational hazard prevention training and student support measures [13].

A study aimed to estimate the prevalence of needle-stick injuries among Iranian nurses. A systematic review and meta-analysis were conducted, involving 29 observational articles from 2006 to 2023, with sample sizes ranging from 68 to 1555 individuals. The pooled prevalence was found to be 46%, with significant differences between teaching hospitals and military hospitals. The prevalence of needle-stick injuries was also higher in regions 1 (Tehran and surrounding provinces) and other regions. Gender-based analysis showed a higher prevalence in women (58% compared to men) than in men (55%). The study concluded that needle-stick injuries are prevalent among Iranian nurses, particularly those working in teaching hospitals, and that interventions to reduce them are necessary. The findings highlight the need for effective interventions to reduce needle-stick injuries among Iranian nurses [14].

This study aimed to identify the prevalence and associated factors of needle stick and sharp injuries among nurses in Taiz, Yemen. A cross-sectional study was conducted on 151 nurses working in three public hospitals in Taiz City. The results showed a high prevalence of needle stick and sharp injuries (95.36%), with around half being injured more than five times. Female nurses and those in an emergency department were more likely to be subjected to these injuries. Needle stick was the most common cause of injury (62.77%), and fingers were the most exposed injury site (79.17%). Non-reporting injuries were very high (73.61%), and only one-third (34.21%) of them proceeded in the management process. Less than one-quarter (23.68%) had been vaccinated. The study concluded that the prevalence of needle stick and sharp injuries among nurses in Taiz is very high, determined by gender and place of work. Poor post-injury reporting and precautions may increase the prevalence of hospital-acquired infections among clients and healthcare providers [15].

A study conducted at the Mogadishu Somalia Turkey Recep Tayyip Erdogan Training and Research Hospital found that healthcare workers are still at risk from needlesticks and sharps injuries, which can expose them to blood-borne diseases like hepatitis B, hepatitis C, and HIV. The study found that there were 233 needlestick and sharps injury incidents in the hospital over a six-year period between 2017 and 2022. The highest number of needlestick and sharps injury cases were reported among nurses (52.4%), followed by cleaners (22.3%), physicians (18.5%), and technicians (6.9%). Operation theaters were the most frequent place (21.9%) where injuries occurred, followed by inpatient care (17.6%) and emergency rooms (16.7%). The most commonly reported instrument resulting in injuries was a hypodermic needle (81.1%). About 24.9% of the needles or sharps devices causing needlestick and sharps injury cases were contaminated with hepatitis B. A significant difference was found between gender and place of injury for needlestick and sharps injuries [16].

Another study aimed to assess the prevalence of needle stick injuries (NSI) among nurses worldwide, considering WHO regions, the socioeconomic development index (SDI), and individual countries' developmental status. The results showed a global NSI prevalence of 40.97%, with the highest prevalence in Southeast Asia and the lowest in the United States. The prevalence in developed and developing countries was 30.5% and 46.6%, respectively. Low-middle SDI countries had the highest NSI prevalence, according to the SDI. The study highlights the high NSI prevalence among nurses worldwide, particularly in developing countries. The findings suggest that continuous training programs should be implemented to enhance nurses' knowledge, performance, and attitude towards NSI prevention in clinical settings. The study's focus was on examining the global prevalence of NSIs in nurses, and no patient or public contributions were considered. The findings highlight the need for continuous training programs to enhance nurses' knowledge, performance, and attitude towards NSI prevention [17].

A study aimed to estimate the global and regional 1-year prevalence of percutaneous injuries (PCIs) among healthcare workers (HCWs). The researchers searched EMBASE, PubMed, CINAHL, and PsychInfo databases for studies published between January 2008 and January 2018. A random-effects meta-analysis was conducted to estimate the pooled prevalence of PCIs among HCWs. The results showed that the pooled global 1-year prevalence estimate of PCIs was 36.4%. Regional variations were found, with the highest prevalence among surgeons at 72.6%. The highest rates were found among medical doctors, nurses, and laboratory staff at 44.5%, 40.9%, and 32.4%, respectively. PCIs were more common among HCWs working in hospital settings than non-hospital settings. The findings suggest high rates of PCIs among HCWs with direct patient care across many regions of the world. However, the lack of data from some countries was a major limitation [18].

This study aimed to determine the prevalence of Needle Stick Injuries (NSIs) among Iranian nurses. A systematic review and meta-analysis was conducted, using electronic databases and a random effects model to estimate the prevalence. The results showed that the frequency of NSIs among Iranian nurses is 18.70%, with the highest frequency in a teaching hospital in Tehran in 2007 at 19.80% and the lowest in 2008 at 17.90%. The study found that sample size, mean age, and work experience were significantly associated with the mean and frequency of NSIs in nurses. The study concluded that NSIs occur in about one-fifth of nurses in Iranian hospitals, and the increase in NSIs has negative consequences for nurses, emphasizing the need for health policymakers and managers to take action to reduce these injuries [19].

Another study aims to assess the prevalence of needlestick and sharp object injuries among healthcare workers in Ethiopia. The pooled prevalence was found to be 40.5 (95% CI: 35.0, 45.9). Factors such as needle-stick, absence of routine precaution, and lack of training increased the odds of needlestick and sharp object injuries. The study found that 40% of healthcare workers in Ethiopia have experienced needlestick and sharp object injuries. The identified factors include recapping, absence of routine precautions, and lack of training. These findings highlight the need for improved safety measures for healthcare workers in Ethiopia, as individual research shows inconsistent results. The findings highlight the need for improved

training and safety measures to prevent these injuries [20].

Discussion:

The healthcare sector is inherently a high-risk environment, particularly for those on the frontlines, such as nurses. Among the various occupational hazards faced by nursing professionals, needlestick injuries constitute a significant concern. These injuries not only pose immediate physical risks but also carry implications for long-term health due to potential exposure to bloodborne pathogens, such as HIV, Hepatitis B, and Hepatitis C [21]. The necessity for improved understanding of the incidence, risk factors, and consequences of needlestick injuries among nurses has become increasingly evident, prompting the scoping review presented in this study. This discussion seeks to synthesize findings from the review, explore their implications, and propose avenues for future research and practice [22].

The scoping review uncovered a multiplicity of factors contributing to needlestick injuries among nurses. Data indicates that, despite the implementation of safety-engineered devices and adherence to universal precautions, the incidence of needlestick injuries persists. Various studies cited in the review consistently reported that training and education on safe handling and disposal of needles directly correlated with decreased incidence rates. However, gaps in knowledge and inconsistent application of safety protocols often led to elevated risk [23].

The demographic analysis within the review revealed that younger, less experienced nurses were particularly vulnerable to needlestick injuries. This finding emphasizes the necessity for tailored educational programs that focus on both the technical and situational awareness dimensions of nursing practice. Hospitals and healthcare facilities must recognize the unique challenges new nurses face, including high-stress environments, heavy workloads, and the steep learning curve associated with clinical tasks involving sharps [24].

Implications for Practice

The evidence compiled in this review prompts a reevaluation of current safety protocols and training methodologies utilized in healthcare settings. It is paramount for nursing leadership and organizational stakeholders to adopt a multi-faceted approach to reduce the incidence of needlestick injuries [25]. Key recommendations emerging from the review include:

1. **Enhanced Education and Training**: Ongoing education programs must be implemented to cover all aspects associated with needlestick injuries. This includes comprehensive training on needle safety, appropriate disposal methods, and the importance of incident reporting. Engaging simulation-based training can offer nurses practical experience in handling sharps safely [25].

2. **Use of Safer Devices**: The advancement of safety-engineered devices has shown promise in minimizing exposure risks. The review indicates that hospitals that systematically adopted these devices experienced a reduction in incidence rates. Further investment in the latest technologies is essential, along with educating all staff about their proper use [25].

3. **Culture of Safety**: Fostering a workplace culture that prioritizes safety can significantly impact injury rates. Encouraging open communication about safety concerns, rewarding proactive behaviors, and institutionalizing regular safety audits can create an environment where nurses feel empowered to report hazards and near-misses without fear of retribution [26].

4. **Comprehensive Incident Reporting Systems**: Although nurses are often aware of the consequences of needlestick injuries, underreporting remains a prevalent issue. Developing comprehensive incident reporting systems that allow for anonymity and straightforward processes can enhance data collection, leading to better analysis and the development of targeted interventions [26].

Future Research Directions

While this scoping review illuminates several pathways to advance the field, it also highlights the need for further research to deepen our

understanding of needlestick injuries among nurses. Future studies should focus on longitudinal analyses to track the effectiveness of implemented interventions over time. Randomized controlled trials evaluating the impact of varied educational interventions on the incidence rates of needlestick injuries would also provide valuable insights.

Moreover, qualitative research exploring the lived experiences of nurses who have suffered needlestick injuries could yield critical contextual information about the emotional and psychological ramifications of these incidents. Such studies could guide the development of support systems that address the holistic needs of affected staff. Additionally, comparative studies across various healthcare settings—urban vs. rural, private vs. public—can shed light on environmental factors that contribute to disparities in injury rates.

Conclusion

Needlestick injuries among nurses represent a critical issue that necessitates continual attention and action within the healthcare sector. The findings of this scoping review underscore the importance of implementing evidence-based strategies to mitigate risks and protect nursing professionals. A collaborative approach involving education, technological advancements, and a culture of safety can foster an environment conducive to reducing the incidence of these injuries. By addressing the complexities surrounding this occupational hazard, healthcare institutions can not only safeguard their workforce but also ensure the delivery of safe and effective patient care. As the healthcare landscape evolves, ongoing research will be essential in shaping policies and practices that prioritize the safety and well-being of nurses.

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