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A Comprehensive Review of Needlestick Injury Prevention Among Nurses

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ABSTRACT

Needlestick and sharp injuries (NSIs) pose a significant occupational hazard for nurses, exposing them to blood-borne pathogens such as hepatitis B (HBV), hepatitis

C (HCV), and human immunodeficiency virus (HIV). Despite preventive measures, NSIs remain prevalent during all stages of sharp device usage. Globally, the World Health Organization estimates that three million nurses experience annual percutaneous exposure to contaminated fluids. This study aimed to investigate the frequency and factors associated with NSIs among nurses at Dammam Medical Complex and propose recommendations for a comprehensive prevention program. A retrospective review of reported NSI incidents over a six-year period revealed that female healthcare workers, particularly nurses and cleaning staff under 40 years old, were most affected. Hypodermic needles were the primary cause of NSIs, with most injuries occurring on the hands. Operating rooms, inpatient settings, and emergency care were identified as high-risk areas. Significant associations were found between the place of injury, gender, profession, cause of injury, and site of injury. The study highlighted the importance of regular education for healthcare workers, especially nurses and housekeepers, on preventing and reporting NSIs. Establishing effective surveillance systems, implementing robust prevention programs with safety-engineered devices, and fostering a culture of safety are crucial for reducing NSI risks in healthcare settings.

Keywords: Nurses, Nsis, Needlestick and Sharp Injuries, Prevention

Introduction

Needlestick injuries (NSIs), which expose nurses to blood-borne pathogens, represent a significant occupational hazard. These incidents can transmit various infectious diseases, particularly viruses such as hepatitis B (HBV), hepatitis C (HCV), and human immunodeficiency virus (HIV). Despite the introduction of preventive measures aimed at reducing sharp injuries, such as improvements in equipment design and staff training, these injuries remain prevalent at all stages of sharp device usage, disassembly, and disposal. According to the U.S. Occupational Safety and Health Administration (OSHA), approximately 5.6 million nurses are at risk of occupational exposure to blood-borne pathogens through NSIs.

Sharp injuries occur whenever an individual encounters a sharp object that can cause harm. Needlestick and sharp injuries result from accidental punctures or cuts caused by needles or other sharp medical instruments, including scalpels, blades, and scissors. While such injuries often result in small skin wounds, the potential consequences can be severe. Medical instruments often encounter blood or other bodily fluids, posing a risk of transmitting infections. When a contaminated device punctures the skin of nurses, it exposes them to a heightened risk of infection from hazardous bodily fluids.

The global burden of needlestick and sharp injuries is significant. A study conducted in 2012 across 52 Ministry of Health hospitals in Saudi Arabia estimated an annual sharp injury rate of 3.2 per 100 occupied beds. Nurses were identified as the most affected job category, wards as the most frequent locations for NSIs, disposable syringes as the primary source of injuries, and device usage as the most common circumstance under which injuries occurred. Memish also reported that the rate of sharp injuries in the United States is 20.7 per 100 occupied beds in teaching hospitals

and 16.5 in non-teaching hospitals (Memish et al., 2015). Furthermore, the Centers for Disease Control and Prevention (CDC) estimates that 385,000 sharp injuries occur annually among hospital workers in the U.S. [1]. Globally, the World Health Organization (WHO) reports that three million nurses experience annual exposure to percutaneous fluids contaminated with hepatitis B (approximately 2,000,000 exposures), HIV (around 170,000 exposures), and hepatitis C (about 900,000 exposures) (Montella et al., 2014).

According to the Ontario Hospital Association/Ontario Medical Association, after a needlestick injury involving a needle contaminated with HBV, there is a 6–30% probability of infection in a susceptible individual. For HCV, the risk of infection is 1.8%, while for HIV, the risk is 0.3%. The likelihood of infection following exposure to contaminated blood depends on several factors, including the type of blood-borne pathogen, the severity of the injury, the immune status of the exposed employee, and the timely and correct use of post-exposure prophylaxis.

Several studies have identified factors that contribute to the risk of NSIs. These include recapping needles, overuse and unnecessary use of sharp devices, lack of devices with safety mechanisms, absence of personal protective equipment and appropriate sharps disposal containers, insufficient engineering controls such as needles with safety features, staffing shortages, lack of adequate training, improper disposal of sharp devices, and patient reactions. Additionally, the inadequacy of protective and safety features in medical devices at the workplace is a significant contributing factor (Wicker et al., 2014).

Research conducted among nurses indicates a strong correlation between the quantity of needles used daily and the likelihood of NSIs. Moreover, extended work schedules have been shown to increase the risk of such injuries. Notably, working hours, particularly shifts lasting 13 hours or more at least once per week, are significantly associated with a higher likelihood of NSIs (Trinkoff et al., 2007).

Assessing the determinants of sharp injuries is essential to guide the implementation of effective prevention standards and programs. This study aimed to investigate the frequency of NSIs among nurses at Dammam Medical Complex, identify factors associated with NSI occurrences, and propose recommendations for a comprehensive prevention program.

Needlestick and sharp injuries (NSSIs) are increasingly common among physicians, nurses, and other healthcare professionals. According to the World Health Organization (WHO), NSSIs represent one of the most critical occupational hazards among healthcare workers (HCWs) globally, with over 2 million occupational exposures occurring annually among approximately 35 million HCWs (Hosseinipalangi et al., 2022). In this study, 8.6% of HCWs reported experiencing at least one NSSI in the past year. An upward trend in reported cases over the years was observed, potentially attributable to the establishment of the infection control department at our center in mid-2017. Initially, staff awareness was low, possibly explaining the reduced number of cases in that year. However, following the implementation of seminars, training programs, and requirements for reporting NSSIs, case numbers increased. Subsequent reductions in cases may be linked to improved awareness or underreporting. The rise in cases during the preceding year may be due

to an increase in hospital staff, particularly among new employees who lacked comprehensive training. Similar findings were reported in a Saudi Arabian study (Alfulayw et al., 2021). Conversely, higher NSSI rates were noted in studies from Ethiopia and South Korea. Additionally, an Iranian meta-analysis of 44 studies found a high prevalence of NSSIs among Iranian HCWs, contrary to the findings of this study. The lower risk of NSSIs observed in this hospital may be attributed to adherence to infection control protocols and greater workplace safety awareness. Another explanation might be the underreporting of incidents to the infection control department. Many HCWs remain hesitant to report injuries sustained at work, with non-reporting rates ranging from 38.9% to 60.2%, as indicated in various studies (Martins et al., 2012).

Several reasons contribute to the non-reporting of NSSIs, including lack of awareness about reporting procedures or requirements, concerns about potential consequences, feelings of shame, the perception that the injury was minor, belief in immunity due to vaccination, fear of being judged as lacking clinical skills, and dissatisfaction with follow-up actions by authorities. In this study, 233 NSSI incidents were reported among HCWs over a six-year period, with female healthcare professionals being most affected individuals. Similar findings were documented in other studies, which could be due to the predominance of women in nursing and cleaning roles. Contrarily, Saadeh et al. reported higher NSSI rates among male HCWs. Most cases involved HCWs younger than 40 years, consistent with previous studies (Saadeh et al., 2020).

This study found that nurses accounted for the majority of NSSIs, which aligns with previous research indicating that nurses are the most affected HCWs, with prevalence rates ranging from 39.7% to 72.7%. This may be due to the nature of nursing work, which involves close patient interaction and frequent use of sharp objects, such as during IV insertions, injections, and phlebotomy. Additionally, the high proportion of nurses among HCWs overall could contribute to the observed NSSI rates. In contrast, Abalkhail et al. reported higher NSSI rates among medical technologists. Following nurses, cleaning staff reported the next highest NSSI rates, consistent with prior studies. Poor disposal practices and the prevalence of needles and other sharp objects in medical waste likely contribute to NSSIs in this group. Some studies have found that physicians, rather than cleaning staff, were the second most affected group after nurses (Omar et al., 2015).

Hypodermic needles were identified as the primary cause of NSSIs in this study. A recent systematic review and meta-analysis confirmed that hypodermic needles were the most common source of NSSIs globally, followed by IV cannulas and surgical needles. Similarly, a cohort study in an Indonesian tertiary care hospital over four years found syringe needles to be the most frequent cause of needle-related injuries. The routine use of syringes and needles for patient care, coupled with processes like recapping and disposal, likely explains the high prevalence of injuries associated with these devices.

The findings showed that most injuries affected the left and right hands, consistent with a study on Jordanian HCWs. This may be due to right-handed individuals using their dominant hand to handle syringes and needles during waste disposal while using the other hand for recapping. Previous studies have similarly identified recapping as a significant factor contributing to NSSIs. In this study, most injuries were described as severe and deep, which contrasts with findings from several prior studies (Berhan et al., 2021). HBV, HCV, and HIV remain the most transmitted bloodborne pathogens after NSSIs. Approximately one-fourth of needles and sharp devices involved in NSSIs in this study were contaminated with HBV, a higher percentage than previously reported but lower than findings from another research. Similarly, 12.9% of devices involved in NSSIs were contaminated with HCV, comparable to some studies [32] but slightly higher than others [3, 22]. Regarding HIV, the proportion of contaminated devices was slightly higher than in previous studies but lower than findings from Yunihastuti et al.

Operating rooms were identified as the most common locations for NSSIs, followed by inpatient and emergency care settings. Previous studies have similarly noted operating rooms as high-risk areas for NSSIs. Contributing factors may include work overload, the need for swift task completion, unfamiliarity with safe sharps handling, and emotional stress from prolonged surgical procedures. However, other studies have reported inpatient care as the most frequent setting for NSSIs (Tukur et al., 2014; Yunihastuti et al., 2020).

This review identified significant associations between the place of injury and gender, as well as between profession, gender, place of injury, cause of injury, and site of injury. Additionally, significant relationships were observed between age, profession, and use of personal protective equipment (PPE) in relation to NSSIs among HCWs.

There are several limitations to this study. First, the retrospective design relied on secondary data, which limited the study variables due to missing details. Second, findings cannot be generalized to all settings, as the study focused on a single tertiary care teaching hospital. Third, the study did not address factors such as underreporting rates, HCW attitudes, and work practices, which may have affected the representation of NSSI incidents over the six-year period.

Despite these limitations, the findings provide valuable insights for improvement. Based on this study, healthcare institutions should regularly educate HCWs, especially nurses and housekeepers, about the importance of preventing and reporting NSSIs.

Factors associated with needlestick injuries

This review revealed a notable frequency of sharp device injuries, impacting 8.4% of healthcare workers (HCWs). This incidence encompassed a range of healthcare professions, with nurses and physicians being most affected. Compared to other studies, this figure was notably lower than the 19.5% reported in one study and the global pooled prevalence of NSIs among HCWs, which stands at 44.5% (Bouya et al., 2020). Within this study, the “other HCWs” category exhibited approximately six times the risk of NSIs compared to nurses, while physicians showed a 1.11% higher

risk than nurses. These discrepancies may stem from underreporting or the voluntary nature of reporting. The hospital in this study had an occupational health and safety program addressing NSIs, but it imposed no penalties for workplace injuries and covered prophylaxis costs after NSI incidents.

NSI Patterns Among Different Healthcare Professions

Distinct patterns emerged between physicians and nurses in this study, highlighting areas of inadequate pre-exposure immunizations among specific employee groups. Nurses constituted the majority of NSIs (52.5%), likely due to their job roles involving frequent direct patient contact and procedures with sharp objects, such as phlebotomy, IV needle insertions, and injections. The proportion of NSIs among nurses aligned closely with their representation in the at-risk workforce (1235 of 2165, or 57%). This high prevalence among nurses is attributed to their numbers rather than elevated individual risk. Physicians were the second most-affected group, consistent with prior research showing nurses experiencing NSI rates between 36% and 72.7% (Kaweti & Abegaz, 2016; Kevitt & Hayes, 2015).

Timing and Locations of NSIs

NSIs occurred predominantly during the morning shift, corresponding to peak medical activities, maximum patient volume, and the largest HCW workforce. The night shift followed, potentially due to fatigue and reduced alertness. These findings align with another study indicating increased injuries during the morning shift.

Regarding locations, NSIs were most frequent in wards, followed by emergency rooms (ER) and operating rooms (OR). This distribution mirrors prior findings (Tosini et al., 2010), with wards accounting for 65.6% of NSIs. Nurses primarily sustained injuries in wards and ERs, while physicians encountered NSIs mostly in ERs and ORs. These patterns reflect the specific tasks and medical activities associated with each professional group. Nurses frequently handle sharp objects during ward procedures such as IV access and injections, while physicians encounter sharp devices, such as scalpels and suture needles, predominantly in surgical and emergency settings.

The frequency of NSIs, affecting 8.4% of workers, underscores the necessity of implementing robust prevention programs. These should include training on standard precautions, consistent use of personal protective equipment (PPE) such as gloves, prohibitions on recapping needles, provision of dedicated sharps disposal containers, HCW immunization, and post-exposure prophylaxis. The findings suggest evaluating whether a universal prevention program is adequate or if interventions should be tailored to specific risk groups. Targeted approaches could enhance cost-effectiveness and ensure that each HCW adopts the most suitable safety practices for their roles.

Few existing programs employ targeted prevention. Training HCWs and introducing needle-safety devices are proven interventions for reducing NSIs (Aziz,

2018). The U.S. Occupational Safety and Health Administration (OSHA) recommends adopting general work practice and engineering controls as primary methods to mitigate NSI risks.

Specific Causes and Risk Reduction Measures

A significant proportion of NSIs (16%) resulted from needle recapping. Mitigation strategies could include mechanical recapping devices, one-hand techniques, or complete prohibition of recapping. A recent review found moderate-quality evidence that safety-engineered injection devices effectively reduce NSI incidence among HCWs (Lavoie et al., 2014).

Physician-oriented prevention programs should emphasize surgical devices and syringes. One study noted nurses are primarily injured by hollow-bore needles (78%), while physicians are injured by devices such as scalpels and suture needles (67.6%). Additionally, blunt suture needles have been shown to reduce exposure risk during surgeries. A Cochrane Review analyzing 10 randomized controlled trials concluded that blunt needles significantly reduce the risk of bloodborne exposure for surgeons (Parantainen et al., 2011).

Vaccination and Immunization Gaps

The review highlighted gaps in hepatitis B vaccination among expatriate HCWs compared to Saudi employees. About 25% of expatriate HCWs either were not vaccinated or had not completed the hepatitis B vaccine series. Rapid turnover, educational limitations, and language barriers among expatriate housekeepers may contribute to these gaps. Verifying full hepatitis B vaccination prior to employment is critical, especially for expatriates. Vaccination protects against severe hepatitis B infections. Saudi Arabia has implemented a hepatitis screening program for expatriates (Alswaidi et al., 2013), though a prior study revealed 40% of blue-collar workers were unvaccinated (Khan et al., 2008). Knowledge levels were significantly associated with vaccination compliance in this cohort.

Use of Gloves and Compliance with PPE Standards

The study found most HCWs used only single gloves during their injuries, though wearing double gloves reduces percutaneous exposure risk. Approximately 16.6% of HCWs were not using gloves during their sharp injuries. A Cochrane Evidence Review of 34 randomized controlled trials indicated moderate-quality evidence supporting double gloves for reducing glove punctures and preventing skin blood stains (Mischke et al., 2014).

Importance of Surveillance Systems in NSI Prevention

Effective surveillance systems are essential for preventing needlestick injuries (NSIs). Most systems rely on administrative databases rather than direct reports from healthcare workers (HCWs), leading to potential gaps in data collection. Furthermore, the application of surveillance techniques is inconsistent. Regular monitoring is crucial to assess the effectiveness of prevention programs and to evaluate different strategies, such as discipline-specific versus general interventions. Evidence suggests that the use of disposable and safety-engineered syringes, as opposed to non-disposable syringes, significantly reduces preventable NSIs. Additionally, there is a

notable decrease in the costs associated with managing these injuries, including psychological issues experienced by workers post-injury (Sabermoghaddam et al., 2015).

Establishing Comprehensive Prevention Programs

Hospitals should implement robust prevention programs to minimize the incidence and risks of NSIs among HCWs and to reduce the likelihood of viral infection transmission resulting from such injuries. There is a growing need to adopt sharp devices equipped with safety engineering controls to mitigate NSI risks effectively. All HCWs must receive comprehensive training on using these safety-enhanced devices and handling sharp equipment safely. Additionally, needle recapping practices should be discontinued, and appropriate disposal of used sharp devices into designated sharps containers must be enforced to prevent injuries.

Strategies for Preventing Sharp Injuries in the Perioperative Setting

Preventing sharps injuries in the perioperative area requires collaboration among healthcare workers (HCWs). Legislative measures at federal, state, and local levels have facilitated advancements in reducing sharps injuries across healthcare settings. Compliance with these laws by healthcare facilities has furthered progress in safety measures. For example, the Needlestick Safety and Prevention Act of November 2000 mandated the use of safety-engineered needles and sharps devices wherever available, providing stricter protections for HCWs. The 2001 revisions to this act emphasized the use of safer medical devices, annual reviews of exposure control plans, the maintenance of a sharp's injury log, and involving HCWs in evaluating and selecting engineered sharps safety devices. In response, manufacturers have collaborated with healthcare providers to design safer, clinically effective, and cost-efficient devices. Administrators and managers in perioperative areas are responsible for ensuring compliance with these standards and fostering a culture of safety concerning blood and body fluid exposures.

The Role of OSHA Bloodborne Pathogen Standard

The incorporation of a safety-focused culture into daily practices is critical, especially in perioperative environments. Efforts to minimize or eliminate the use of needles and sharp instruments are essential. The OSHA Bloodborne Pathogen Standard has significantly increased compliance with sharps safety requirements across many healthcare facilities. This compliance is evident in the widespread adoption of safety needles and needleless intravenous devices. The OSHA standard is one of the most impactful mandates in healthcare, aimed at preventing the transmission of bloodborne pathogens to both HCWs and patients. The standard has prompted healthcare providers, state health departments, regulatory bodies such as The Joint Commission, and professional organizations like the American Medical Association and the Association of Perioperative Registered Nurses to revise their standards of care and practice (Tso et al., 2012).

Trends in Sharps Injuries in Surgical Settings

Despite overall improvements, the surgical setting has experienced a 6.5% increase in sharps injuries, as reported by Jagger et al. From 1993 to 2006, surgical personnel accounted for 7,186 of the 31,324 reported sharps injuries. Following the enactment of the Needlestick Safety and Prevention Act, non-surgical settings saw a 31.6% reduction in injury rates, whereas surgical settings witnessed a rise of 6.5%. Approximately 75% of accidental sharps injuries in operating rooms occurred during device use or when passing devices between HCWs. The most frequently implicated devices were suture needles (43.4%), scalpel blades (17.0%), and syringes (12.0%) (Jagger et al., 2010).

Administrative and Work Practice Strategies for Prevention

Administrative Strategies

A comprehensive written exposure control plan is essential to minimize employee exposure to bloodborne pathogens. These policies must align with real-world practices and be regularly monitored for effectiveness. All team members, including surgeons, anesthesiologists, nurses, and technicians, must adhere to the OSHA Bloodborne Pathogen Standard and local infection control guidelines. Administrators must provide appropriate personal protective equipment (PPE) in sufficient quantities, ensuring options are hypoallergenic and available in various sizes. The use of double gloving, glove liners, and knitted outer gloves can further reduce the risk of perforations. The American College of Surgeons advocates for double-glove and under-glove techniques to minimize exposure risks associated with glove tears and sharps injuries. However, surgeons may opt out of this practice in delicate procedures where patient safety could be compromised.

Work Practice Strategies

Despite longstanding safety practices in the perioperative area, sharps injuries persist. Implementing additional work practice controls can further reduce risks. Strategies include substituting endoscopic surgery for open procedures when feasible and fostering a safety-conscious culture in perioperative settings.

Pre-Procedure Measures

1. Organize equipment thoroughly.
2. Eliminate unnecessary needles and sharps when possible.
3. Establish a neutral zone to control the location of sharps, using hands-free transfer trays or brightly colored (e.g., orange) drapes to reduce injury risks and contamination.
4. Keep sharps pointed away from the user.

Intra-Procedure Measures

1. Avoid passing exposed sharps directly from one person to another.
2. Notify team members when sharps are being passed.

3. Activate the safety features of engineered devices immediately after use.
4. Observe audible or visual cues to confirm the device's safety features are engaged.
5. Ensure adequate lighting is maintained throughout the procedure.

Post-Procedure and Cleanup Measures

1. Inspect procedure trays, waste materials, and linens for exposed sharps before handling.
2. Carefully examine containers when disposing of sharps.
3. Avoid placing hands inside sharps containers, always keeping hands behind sharps.
4. Be aware of the risk of tubing recoil, which can lead to injury, and maintain control of both the tubing and the device during disposal.
5. Inspect sharps containers for overfilling and replace them before they become hazardous.

Daily Team Practices

1. Report all sharps injuries, blood or body fluid exposures, hazards, and near misses.
2. Involve all staff members in surveys and evaluations of devices.
3. Encourage adherence to safe practices across the team, including surgeons, nurses, and technicians, while supporting coworkers in maintaining safety measures.

Engineering Controls and Innovations in Preventing Sharps Injuries in Perioperative Areas

The introduction of novel work practice strategies in the perioperative setting necessitates the implementation of engineering controls. These controls are specifically designed to isolate or eliminate the hazard of bloodborne pathogens in the workplace. As the most innovative category of strategies, engineering controls include safety-engineered sharps that, if clinically appropriate and effective, should be thoroughly evaluated for potential use. However, while these controls significantly reduce exposure risks, they do not fully eliminate the possibility of encountering bloodborne pathogens. Safety devices alone cannot achieve the ultimate goal of zero sharps injuries. Surgeons must be encouraged to use clinically appropriate safety-engineered devices, such as alternative cutting methods, including blunt electrocautery and laser devices, whenever suitable.

Research has indicated that retractable phlebotomy and intravascular devices can generate blood splatter that is imperceptible to the naked eye. This splatter can reach the mucous membranes of nearby healthcare workers (HCWs), highlighting the

importance of wearing personal protective equipment (PPE) during procedures such as phlebotomy and intravenous catheterization (Haiduven et al., 2009). It is imperative for HCWs to take responsibility for adequately protecting themselves against such splatter, and further advancements in safety technology are required to mitigate these risks.

Effective safety mechanisms should be integrated directly into the design of devices to protect HCWs. Such devices should ensure that hands are kept away from sharp surfaces and must offer immediate protection following use. While most safety mechanisms require user activation, they should provide robust safeguards through proper disposal. In surgical contexts, the development of technology tailored to specific types of procedures and instruments is essential. The introduction of any new safety device must be accompanied by comprehensive staff training and ongoing follow-up to promote positive acceptance and consistent use.

Blunt-Tip Suture Needles and Recommendations

To address the significant risks associated with sharp-tip suture needles, regulatory bodies such as OSHA, the National Institute for Occupational Safety and Health (NIOSH), the Centers for Disease Control and Prevention (CDC), and the Department of Health and Human Services have endorsed the use of blunt-tip suture needles. These organizations have highlighted their effectiveness in reducing percutaneous injuries among surgical personnel. Sharp-tip suture needles account for 51% to 71% of all percutaneous injuries in operating room (OR) settings and pose a dual risk of transmitting pathogens to HCWs and exposing patients to the injured staff's blood. Such injuries frequently occur during fascia and muscle suturing.

The American College of Surgeons, in its Statement on Sharps Safety, advocates for the use of blunt-tip suture needles for closing fascia and muscle as a measure to reduce needlestick injuries among surgical and OR personnel. In the context of vaginal delivery, some studies have debated the efficacy of blunt-tip needles in laceration and episiotomy repairs. While one study found them to be safe and effective in reducing injuries during such procedures (Mornar & Perlow, 2008), another concluded there was no notable difference in surgical glove perforation rates between blunt and sharp needles for vaginal laceration repairs. The latter study also reported that physicians faced greater challenges in performing repairs with blunt-tip needles (Wilson et al., 2008). Continued research is essential to assess the usability and effectiveness of various safety devices.

Bloodborne Exposure in Obstetric Settings

Concerns about bloodborne exposure are particularly acute in obstetric areas, including delivery rooms and ORs during cesarean sections. Umbilical cord blood poses a significant risk, with studies showing that at least 39% of vaginal deliveries and 50% of cesarean deliveries result in the exposure of at least one HCW to cord blood. Alarmingly, 80% of such splashes and fluid exposures are not reported.

To address this issue, several safety devices have been developed to minimize exposure to cord blood splatter. These devices allow for the safe clamping and cutting of the umbilical cord and the secure collection of blood samples.

Universal Compliance and Technological Advancements

The cornerstone of sharps injury prevention strategies in perioperative areas remains strict adherence to the OSHA Bloodborne Pathogen Standard. Institutions must ensure that their written exposure control plans are updated annually or whenever new safety devices and protocols are implemented. Emerging technologies are instrumental in the creation of devices that meet the evolving safety needs of HCWs in perioperative environments. Maintaining a safety-focused culture and fostering collaboration among perioperative teams is essential for achieving substantial reductions in sharps injuries.

Conclusion

This review highlights the persistent challenge of needlestick and sharp injuries (NSIs) among nurses, emphasizing the occupational hazards they face due to their frontline roles in patient care. Despite advancements in legislation, such as the Needlestick Safety and Prevention Act and the development of safety-engineered devices, NSIs remain prevalent due to gaps in training, reporting, and adherence to preventive measures.

Factors such as recapping needles, inadequate engineering controls, and improper disposal practices contribute to these injuries. Nurses are disproportionately affected due to their frequent interactions with sharp devices during procedures like phlebotomy and IV insertions. The lack of consistent use of personal protective equipment (PPE) and vaccination further exacerbates their vulnerability.

The review underscores the need for targeted prevention programs that address specific risks within nursing practices. These include enforcing strict compliance with OSHA Bloodborne Pathogen Standards, providing comprehensive training on safe handling practices, and implementing advanced engineering controls. The adoption of blunt-tip suture needles, double-gloving techniques, and safety-designed devices shows promise in reducing exposure and injury rates.

For effective prevention, healthcare facilities must foster a culture of safety through universal compliance, regular evaluation of safety measures, and ensuring that all staff, especially nurses, receive adequate support and resources. Such initiatives are vital not only for the safety of nurses but also for the overall integrity of healthcare systems in mitigating risks associated with bloodborne pathogens.

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