

Approaches to Prevent and Mitigate Needlestick Injury:

Literature Review

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Needlestick injuries (NSIs) are a significant occupational hazard for healthcare workers. These injuries are common worldwide, with as many as 800,000 cases in the United States annually (Rapparini, 2006, as cited in Akhuleh et al., 2019). Moreover, injury from sharp instruments puts workers and their families at risk for contracting blood-borne infections like HIV and Hepatitis C (Akhuleh et al., 2019). Although NSIs are a risk to any healthcare worker who comes in contact with needles, the available literature indicates that nurses have the highest exposure incidence; Garus-Pakowska and Górajski (2019) found that nurses and midwives reported NSIs more than twice as frequently as physicians. Given the incidence of and potentially serious consequences from exposure to needlesticks for nurses, it is worth considering methods to reduce occurrences and, if exposed, to mitigate risk.

Needlestick and Sharp Injuries Among Registered Nurses: A Case-Control Study

In this study, d'Ettore (2017) performs a cross-sectional case-control analysis to identify any relationship between the schedules of Registered Nurses (RNs) and their exposure to needlestick and sharp injuries (NSSIs). Specifically, this research aimed to determine if the shift, number of hours, or the number of consecutive days worked by RNs influenced their risk of NSSIs (d'Ettore, 2017). The researcher selected 765 RNs for inclusion in the study and generated all statistical analyses using SPSS software (d'Ettore, 2017). Using logistic regression, the author determined that RNs who worked nights more frequently than their peers had increased odds ratios for NSSIs (d'Ettore, 2017).

Key Points

This study's essential findings fall under two categories; factors that increase the apparent risk of NSSIs and those that are not associated with an increased risk of NSSIs. The former category included working three or more night-shifts in seven days or working nine or more night-shifts in 28 days (d'Ettore, 2017). These results seem to be consistent with those of related research efforts. Gabr et al. (2018) found that working more than two night-shifts in a month was associated with a greater risk of NSI. This study's data analysis did not indicate a link between increased incidence of NSSIs and the total hours or number of consecutive shifts worked in 28 days (d'Ettore, 2017). More relevant to this literature review's purpose is how the results should inform efforts to prevent NSIs. Based on the findings, d'Ettore (2017) recommends that RNs not work more than two night-shifts weekly or eight night-shifts monthly. Furthermore, the author proposed that employers utilize a forward-rotating schedule for shift work as a preventative measure against NSSIs (d'Ettore, 2017).

Assumptions

This study selected its subjects from a single hospital in Italy (d'Ettore, 2017). Ergo, there is an implied assumption that RNs at this hospital are similar to RNs elsewhere. Furthermore, the author used control comparison figures expressed as NSSIs per 100 full-time equivalent positions, which suggests an assumption that part-time workers are substantially similar to full-time employees (d'Ettore, 2017).

Deficit/Conclusion

In terms of problems with the study, d'Ettore (2017) conceded that the data collection interval of two years and the sample size of 765 RNs are relatively small. Furthermore, the investigation

scope included only NSSIs and not other work-related injuries (d’Ettore, 2017). Therefore, it is faulty to assume factors with no link to increased NSSIs are not associated with injury in general.

The question addressed by this article is justifiable based on the available literature concerning shift-work and job performance. For example, Ball et al. (2017) found that nurses who worked night-shift self-reported delivering poor nursing care, compromised patient safety, and dissatisfaction with their jobs at higher rates than nurses working day-shift. The research by d’Ettore (2017) tests the inference that working night-shift, which is associated with diminished job performance, may also be associated with the frequency that NSSIs occur. Serious consideration of this study’s results suggests that effective prevention of NSSIs requires calling for changes in scheduling practices at the institutional level. However, scheduling changes may not be a practical approach; though adopting the author’s recommendations may be desirable, organizations must also balance their staffing needs and their employees’ preferences. On the other hand, failing to consider the studies’ results seriously risks ignoring significant risk factors for a widespread problem and inhibiting finding solutions.

Trends in Needlestick Injury Following Regulatory Change in Ontario, Canada (2004-2012): An Observational Study

In 2007 Ontario introduced a regulation to promote safety-engineered needles, which came into full effect in July 2010 (Chambers et al., 2015). Chambers et al. (2015) perform an observational study to determine how this change impacted the incidence of NSIs. Specifically, the authors are questioning if, following the adoption of the policy of interest, fewer NSIs occurred compared to before policy adoption. The study uses data concerning work-related emergency department visits and worker’s compensation claims between 2004 and 2012

collected from the Ontario Workplace Safety & Insurance Board to answer this question (Chambers et al., 2015). The authors assert that while their results indicate drastic reductions in NSIs in both acute and long-term care settings following the regulation's adoption, NSIs remain a considerable burden to Ontario's health system (Chambers et al., 2015).

Key Points

The authors' use of data to answer their question is straightforward. Chambers et al. (2015) found that there was a 31% decrease in compensation claims for NSIs by hospital workers between 2004 and 2012. The reduction in claims by long-term care workers was even greater at 67% (Chambers et al., 2015). Across all sectors, the total number of workers compensation claims in all sectors decreased by 340 in the same period (Chambers et al., 2015). The authors' analysis also revealed a 43% decrease in work-related emergency department visits associated with NSIs between 2006 and 2011 for workers in the health and social services sector (Chambers et al., 2015). All these findings serve as evidence for the efficacy of a policy-based intervention. While these reductions are considerable, there were still 1635 claims associated with NSIs in 2012 (Chambers et al., 2015). Thus, Chambers et al. (2015) conclude that NSIs are still a significant problem despite effective regulatory measures.

Assumptions

This study uses data from only Ontario, Canada (Chambers et al., 2015). Thus, there is an assumption that workers in Ontario are similar to workers from other locations. Furthermore, the study uses work-related emergency department visits and worker's compensation claims to indicate the incidence of NSIs (Chambers et al., 2015). Ergo, that workers reliably seek

treatment, and compensation for NSIs is assumed. The study also considers no influence by extraneous variables (Chambers et al., 2015).

Deficit/Conclusion

While the results of this study do offer evidence for the efficacy of using regulation, and, implicitly, safety-engineered needles to reduce NSIs, the authors do not attempt to explain data that conflicts with their results on the whole. For instance, during the study period, there was a 1% increase in worker's compensation claims related to NSIs for workers in the nursing services sector (Chambers et al., 2015). The authors of the study do not propose an explanation for this increase, nor do they clearly define the nursing services sector (Chambers et al., 2015). These omissions are consequential because they leave ambiguity regarding whether regulatory requirements for safety-engineered needles are useful for reducing nurses' NSIs.

Taken in their totality, the results of this study are consistent with the available literature. Jackson et al. (2020) regard legislative efforts as a beneficial and ordinary, if imperfect, way to decrease NSIs. This sentiment reflects the authors' point of view that NSIs continue to be a problem despite the efficacy of policy-based intervention (Chambers et al., 2015). The effectiveness of safety-engineered devices as a means to reduce the incidence of NSIs is supported by evidence, with studies revealing decreases in NSIs by as much as 70% (Hanmore et al., 2013, as cited in Jackson et al., 2020). In one integrative review, 10 out of 11 selected studies associated the use of safety devices with a decrease in NSIs (dos Santos et al., 2018). The research by Chambers et al. (2015) tests the inference that because safety-engineered devices can prevent NSIs, requiring them by regulation may result in fewer NSIs. If we take the results of this study seriously, it implies that legislation requiring the use of safety-engineered needles is a

justifiable part of a multi-faceted approach to reducing NSIs. It is important to note, however, that the effectiveness of regulation inherently depends on compliance. If enforcement measures are necessary to ensure workers are following regulations, consideration must be given to the costs of enforcing them. In contrast, a failure to take the studies' results seriously implies that an intervention capable of dramatically reducing NSIs is not worth utilizing.

Nursing students: A Vulnerable Health-Care Worker for Needlesticks Injuries in Teaching Hospitals

Hada et al. (2018) perform a retrospective study that compares the frequency of reported NSIs in nursing students to other workers at an Indian teaching hospital. This research's nature is fundamentally exploratory; the critical question Hada et al. (2020) seeks to answer is which group of health care workers at the location studied has the highest incidence of NSIs. Data for the study was collected from the hospital's informatics department and covered 28 months (Hada et al., 2018). By a considerable margin, student nurses were the most likely group to report NSIs (Hada et al., 2018). Additional analyses on nursing students include the type of injury sustained, the time it took to disclose NSIs, and hepatitis-B vaccination status (Hada et al., 2018). Based on their findings, Hada et al. (2018) recommend offering regular training and mandating complete hepatitis-B vaccination.

Key Points

In the study cohort, Hada et al. (2018) noted NSIs were most frequent in nursing students, which accounted for 25 cases and 39.7% of all NSIs. They were followed by housekeepers, who reported 9 cases (Hada et al., 2018). It should not escape attention that these results indicate that

nursing students are not merely more likely to sustain NSIs; they are drastically more likely to do so. Student nurses accounted for more reported NSIs than housekeepers, nursing staff, and senior residents combined (Hada et al., 2018). Moreover, the types of injury they sustain are a cause for concern. Hada et al. (2018) reported that of the nursing students that disclosed NSIs, 13 out of 25 suffered a deeply penetrating percutaneous injury. These NSIs are particularly dangerous because they are associated with an increased risk of HIV transmission (Jayanth et al., 2009, as cited in Hada et al., 2018; Cardo et al., 1997, as noted in Hada et al., 2018). In each of the 25 cases, the nursing students reported the incident before 24 hours, with more than half reporting sooner than two hours post-exposure (Hada et al., 2018). Concerning hepatitis-B vaccination status, 72% of nursing students had completed vaccination, 24% had not completed the series, and 4% had not received any vaccine (Hada et al., 2018).

Assumptions

This study relies on reported incidents, which assumes that all health care workers divulge when they sustain a needlestick. The authors concede that underreporting of NSIs is a barrier to effective prophylaxis following needlesticks (Hada et al., 2018). One questionnaire found that 74.7% of healthcare workers with NSIs failed to report them (Hanafi et al., 2011, as cited in Hada et al., 2018). The sample used consists of healthcare workers at a single teaching hospital in India (Hada et al., 2018). Therefore, the authors assume that workers at this hospital are similar to other healthcare workers.

Deficit/Conclusion

One problem in this study is that it relies on a doubtful assumption that the studied groups' reporting of NSIs is accurate. The authors seem aware of this issue and insinuate that surgeons and surgical students may be less motivated to report NSIs because they often know the serological test results of the patients they work with (Hada et al., 2018). Essentially, the line of thinking is that if one knows that exposure to infectious disease is unlikely, they lack the incentive to admit a mistake. It is also worth mentioning that because this study deals with a small sample at a single location, confirmation by more extensive studies would be useful.

Despite these flaws, the thrust of the authors' conclusions seems well-founded. They cite additional evidence of a relationship between inexperience and vulnerability to NSIs and propose changes that seem reasonable given their findings (Jaynath et al., 2009, as cited in Hada et al., 2018; Hada et al., 2018). It is additionally noteworthy that there is support in other studies to conclude that student nurses are vulnerable to NSIs. For instance, Nirmala and Suni (2019) report that 39.76% of nursing students in a single program sustained NSIs. Furthermore, the suggestion of mandatory hepatitis B vaccination proposed by Hada et al. (2018) addresses a common-sense corollary of their results. If a group is vulnerable to NSIs, and voluntary compliance with hepatitis B vaccination is not uniform, mandating vaccination makes sense. Indeed, there is available evidence to suggest that vaccine compliance is a problem in health care workers. In one study at a tertiary care center, among workers exposed to NSIs, only 44.6% report complete hepatitis B vaccination (Thiyagarajan et al., 2019).

The study by Hada et al. (2018) makes two main inferences. First, that different groups of workers may have differences in exposure to NSIs. Second, because student nurses are at a higher risk for NSIs, they may also be at increased risk for complications. If we take the results

of this study seriously, it implies that student-targeted interventions to reduce needlesticks and complications from them are warranted. One recommendation is expanding education focused on the prevention of NSIs (Hada et al., 2018). If we fail to give serious consideration to this study's findings, the implication is that we risk leaving a high-risk group unnecessarily susceptible to injury and infectious disease.

Conclusion

This literature review reveals a factual basis to justify further study and provides vital evidence to guide future efforts. It is useful to perform an accounting of what this review has elucidated; we have three primary findings from this effort. First, evidence suggests that among health care workers, nurses, and nursing students are particularly at risk for NSIs (Garus-Pakowska and Górajski, 2019; Hada et al., 2018). This finding's significance is that by identifying vulnerable groups for NSIs, future research can find interventions targeted for them. Second, working frequent night-shifts may increase a nurse's probability of sustaining NSIs (d'Ettore, 2017; Gabr et al., 2018). This finding grants legitimacy to calls to explore the issue more closely and consider institutional reforms in scheduling practices. While it is true that some workers must work night-shift, limiting the frequency that individual nurses work nights may yield a reduction in NSIs for that population. Finally, it is well-supported that governmentally backed regulatory initiatives mandating safety-engineered devices decrease the frequency of NSIs (Chambers et al., 2015; Jackson et al., 2020). From this, we can infer that government mandates give rise to institutional change and that it is worthwhile to consider other policy initiatives aimed at reducing NSIs. For instance, the United States could legislatively cap the number of night-shifts nurses work during a given time frame. Based on the information

gathered by this literature review, this student endorses no specific interventions aside from the use of safety-engineered devices but does believe that subsequent investigation of this topic is warranted.

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