

Hypodermic Needlestick Injuries – Worsening Trajectories

Background

Needlestick Injuries (NSIs) to healthcare workers represent an ongoing crisis despite legislative and educational efforts. Broader delivery of health care and organized vaccination programs are among the factors underlying a dramatic rise in U.S. and worldwide medical syringe and needle use of the past 25 years. A 2016 WHO commission report places the number of injections given worldwide above 16 billion per year.¹ A large proportion of healthcare workers admit personally sustaining a contaminated NSI over their career, yet dramatic underreporting limits a full understanding of this potentially life-threatening problem.² This paper examines recent worrisome trends demonstrating increased injection-related needlestick injuries among healthcare workers.

Healthcare Worker Sharps Injuries: Legislation & Education

The Needlestick Safety & Prevention Act (NSPA), H.R. 5178, was enacted by Congress in November 2000, in response to recognized increases in healthcare worker sharps injury rates. This federal legislation mandated the Occupational Safety and Health Administration (OSHA) to include additional requirements in its Bloodborne Pathogens Standard (BPS). This includes the requirement for healthcare facilities to regularly review evaluation and use of “safer medical devices designed to eliminate or minimize occupational exposure.” OSHA BPS requires employers to maintain a Sharps Injury Log and an Exposure Control Plan. Focused efforts to reduce healthcare worker sharps and needlestick injuries by federal and state legislation were amplified by campaigns for increased awareness and education, highlighting the problem and working towards solutions. These efforts included organized efforts by the International Safety Center, the American Nursing Association (ANA) and the National Institute for Occupational Safety and Health (NIOSH).

Collection of Sharps Injury and Needlestick Injury Data

While U.S. healthcare workplaces are mandated to maintain injury logs, they are not required to submit their data to OSHA and results are therefore not publicly available. No coordinated mechanism is present for the centralized collection and review of injury data in the U.S. at the national level. Due to this and other factors, available data on the incidence of needlestick injuries is limited. The Exposure Prevention Information Network (EPINet®) was developed by Epidemiologist Dr. Janine Jagger to address this need and is one of the few sources of longitudinal high-quality information on this occupational injury. The International Safety Center maintains EPINet®, gathering voluntarily submitted sharps and needlestick injury data in a standardized and consistent fashion. Data is currently available from 1997, prior to the federal NSPA legislation, through recently released

2019 data and is made publicly available for review and research purposes.⁴

Trends in Overall NSI Rates Over Time

Review of the EPINet® overall NSI data reveals an improvement in NSIs in the period immediately following the enactment of the 2000 NSPA (Table 1.)

TABLE 1
Overall NSI Rates per 100/ADC

1997-2000	34.8
2001-2004	23.7
2005-2009	26.0
2010-2014	21.9
2015-2019	31.0

Comparison of the time period prior to the federal legislation (1997-2000) to the time period immediately following (2001-2004) demonstrates a 32% reduction in healthcare worker NSIs. Previously published studies have shown this to be a statistically significant improvement.³

EPINet® data on overall NSI rates over the following 10 years (2005-2014) demonstrates no further meaningful improvement in NSI rates. A concerning rise is seen in the data in the most recent time period (2015-2019) to 89% of the pre-legislation NSI rate. Despite the recent negative trend, current rates of overall NSIs remain below pre-legislation levels and show improving trends within this most recent time period (Table 2.)

TABLE 2
Overall NSI Rates per 100/ADC

2015	31.7
2016	33.7
2017	33.8
2018	29.7
2019	26.3

NSI Rates With Hypodermic Injection

Examination of the EPINet® data specific to intramuscular/subcutaneous injection demonstrates a different trend pattern as compared to the overall injury data. These hypodermic-based injections account for nearly one-quarter of all the recorded injuries in the EPINet® database. EPINet® annual reports categorize the reported injury with a question identifying “for what purpose the sharp item was originally used.” Injuries resulting from intramuscular and subcutaneous injection account for 23.9% of the recorded sharps injuries over the full 1997-2019 time period.

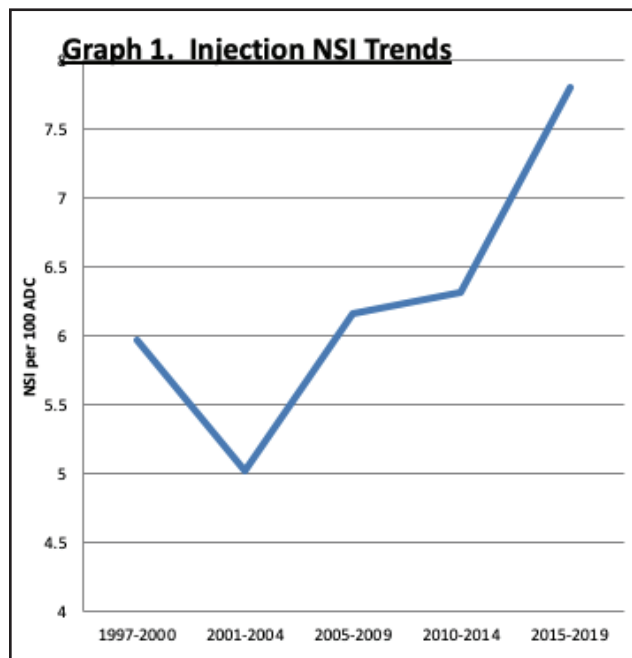
The trend of injury rates with hypodermic injection shows a smaller percentage improvement in the years immediately following enactment of the federal legislation (2001-2004), with a 15.9% reduction from 1997-2000 levels (Table 3.) The magnitude of improvement from pre-NSPA levels was only half of that seen as compared to the 32% reduction calculated for all NSIs.

TABLE 3
Injection NSI Rates per 100/ADC

1997-2000	6.0
2001-2004	5.0
2005-2009	6.2
2010-2014	6.3
2015-2019	7.8

Injection Injuries: Troubling Trends

A concerning trend is seen upon review of the data from the 10 year period 2005-2014 which demonstrates a rise in hypodermic injection injury rates to above 1997-2000 levels. A further rise in hypodermic injection NSI rates occurred in the most recent time period (2015-2019) to levels greater than 30% above 1997-2000 pre-NSPA legislation levels (Graph 1.)



Safety-Engineered Injection Devices

Specific design modifications to medical devices which carry the potential to cause a sharps/needlestick injury are often referred to as sharps injury prevention (SIP) devices. EPINet® records if a reported sharps injury was sustained with a safety or non-safety device. In the years following the federal legislation, approximately one out of every three needlestick injuries occurred despite the use of a safety-engineered SIP device. Review of data from the 2019 EPINet® report demonstrates that over 80% of NSIs from safety devices occurred at a time when their safety feature not activated or only partially activated. One conclusion that can be drawn from the available data is that NSIs continue to occur with the currently available safety-engineered devices.

TABLE 4

Years	% NSI Safety Device	SI per 100 ADC	Safety Device Injuries per 100 ADC
1997-2000	9.5%	34.8	3.3
2001-2004	30.4%	23.7	7.2
2005-2009	37.5%	26.0	9.7
2010-2014	41.5%	21.9	9.1
2015-2019	36.1%	31.0	11.2

Conclusions & Future Directions

Needlestick injuries with the potential to transmit deadly pathogens continue to represent an occupational risk to healthcare workers despite legislative, educational and medical industry efforts. The improvement seen in overall sharps and needlestick injury rates is not seen in the group of injuries related to intramuscular and subcutaneous injections. Worrisome trends demonstrate escalating injury rates in this group of commonly performed medical procedures. Observation and examination of needlestick injury data underscore the reality that current medical devices engineered to prevent these injuries have failed in that mission at the present time. The majority of needlestick injuries experienced with the use of safety devices occur without complete activation of the safety mechanism. Safety mechanisms that fully activate automatically have the potential to significantly reduce injuries. Innovation in the design of hypodermic syringes to achieve elimination of this avoidable potentially life-threatening healthcare worker occupational injury is urgently needed.

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