



NEEDLESTICK INJURIES AND HEALTHCARE WORKERS: THE US EXPERIENCE

With the potential for emotional as well as physical damage, needlestick injuries are a burden on the healthcare industry.

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OVER TEN MILLION WORKERS ARE NOW EMPLOYED IN THE healthcare industry in the USA, covering a range of occupations from nurses and doctors to pharmacists, laboratory technicians and dental assistants. Healthcare services are growing at twice the rate of the overall economy — rivalling the hi-tech field — with over three million new jobs projected by 2006. Healthcare workers perform their jobs in complicated environments that pose a variety of biological, chemical, physical, biomechanical and psychosocial hazards. As a result, they are at high risk of back injuries, latex allergy, violence and stress. While it is possible to prevent or reduce exposure to these hazards, occupational injuries and illnesses are actually rising in this sector, in contrast to the workforce as a whole.

Needlestick injuries contribute to the overall burden of healthcare worker injuries. Although it is not known exactly how many work-related needlestick injuries occur each year, estimates indicate that 600,000 to 800,000 such injuries occur annually, around half of which go unreported. At an average hospital, workers incur approximately 30 reported needlestick injuries per 100 beds per year. Most reported incidents involve nursing staff; however, laboratory staff, physicians, housekeepers and other healthcare workers are also injured. Workers outside the hospital setting — in clinics, private medical and dental offices, nursing homes, correctional facilities, and in the community, such as emergency medical response workers — are also at risk.

Needlestick injuries and risk of disease

Numerous sources have documented cases of occupationally acquired blood-borne pathogens — such as HIV,

hepatitis B (HBV) and/or hepatitis C (HCV) — in healthcare workers. Additional evidence indicates that needlestick injuries may be the source exposure to such viruses. For example, among 56 'documented' cases and 136 'possible' cases of occupationally acquired HIV infection recorded by the US Centers for Disease Control and Prevention (mostly involving nurses and laboratory technicians), percutaneous injury — such as needlesticks — was associated with 89 per cent of the documented occupationally acquired infections.

Other studies that followed healthcare workers with occupational HIV exposure estimate that, on average, three out of every 1000 workers with a single percutaneous exposure to HIV-infected blood will become infected with HIV. Most healthcare workers are immune to HBV due to pre-exposure vaccination. However, studies carried out before the availability of HBV vaccine showed rates of HBV transmission ranging from 6–30 per cent after a single needlestick exposure to an HBV-infected patient. The precise number of healthcare workers who have acquired HCV occupationally is not known. However, epidemiological studies of workers exposed to HCV through a needlestick or other percutaneous injury have found that the incidence of infection averages 1.8 per cent per injury.

A healthcare worker's risk of infection depends on several factors, such as the pathogen involved, the severity of the needlestick injury and the availability and use of pre-exposure vaccination and post-exposure prophylaxis. For instance, an epidemiological study of healthcare workers who had percutaneous exposures to HIV found that the risk of HIV transmission was increased in certain circumstances: when the worker was exposed to a larger quantity of blood from the patient; during a procedure that involved placing a needle in a patient's vein or artery; concerning a deep injury; or when the patient was in a phase of the illness associated with higher viral levels.

Post-exposure prophylaxis is available for hepatitis B and HIV exposures, but not for hepatitis C. However, it is important to note that preventing the needlestick injury in



the first place is the best approach to preventing these diseases in healthcare workers, and it is an important part of any blood-borne pathogen prevention programme in the workplace.

Emotional impact of needlestick injuries

Studies have shown that the emotional impact of a needlestick injury can be severe and long lasting, even when a serious infection is not transmitted. This impact is particularly severe when the injury involves exposure to HIV. In one study of 20 healthcare workers with an HIV exposure, 11 reported acute severe distress, seven had persistent moderate distress, while six quit their jobs as a result of the exposure. Other stress reactions requiring counselling have also been reported. Not knowing the infection status of the source patient can accentuate the healthcare worker's stress, as they face difficult decisions about undergoing medical treatment with both short-term and long-term side effects. In addition, the worker is advised to use barrier contraception and to postpone decisions on childbearing. Colleagues and family members of the healthcare worker may also suffer emotionally.

How needlestick injuries occur

Data from surveillance programmes shows that hollow-bore needles — including hypodermic needles attached to disposable syringes and winged-steel (butterfly) needles — are associated with the majority of injuries. Surveillance data also indicates that approximately 38 per cent of percutaneous injuries occur during use, when a needle or other sharp device being manipulated in a patient becomes accidentally dislodged. Other injuries occur after use during cleanup, or in association with the disposal of a sharp device.

The circumstances leading to a needlestick injury depend partly on the type and design of the device used. In addition to risks related to device characteristics, needlestick injuries have been related to certain work practices, such as recapping, transferring a body fluid between containers and failing to properly dispose of used needles in puncture-resistant 'sharps' containers.

Preventing needlestick injuries

Based on a review of the science, the National Institute for Occupational Safety and Health (NIOSH) recommends a comprehensive programme for preventing needlestick injuries that includes improving engineering controls, allied with training and surveillance.

Research has shown that engineering controls — which include eliminating the unnecessary use of needles and implementing the use of devices with safety features — are effective in preventing needlestick injuries. For example, some studies have shown that needleless or protected-needle IV systems decreased needlestick injuries related to IV connectors by 62 to 88 per cent. Other research

concluded that safer IV catheters, which encase the needle after use, reduced injuries related to IV insertion by 83 per cent in three hospitals. Additional studies have shown that safety features reduce phlebotomy injuries (in other words, those involving blood sampling). Moreover, a number of sources have identified the desirable characteristics of safety devices — including needleless features that work passively safely and effectively for patient care — which can be used as guidelines for device design and selection.

In addition to changes in the use of medical devices, other factors that must be addressed in the prevention of needlestick injuries include modification of hazardous work practices, administrative changes to address needle hazards in the environment (for example, prompt removal of filled sharps disposal boxes), safety education and awareness, feedback on safety improvements, and action taken on continuing problems.

The critical role of appropriate training has been emphasised by several recent reports of increased patient bloodstream infections associated with improper care of needleless IV systems, primarily in the home healthcare setting. This data emphasises the need for patient safety surveillance, thorough training and occupational injury surveillance, when implementing the use of a new device.

All of these components are most effective when integrated into a comprehensive safety programme that considers all aspects of the work environment and that has employee involvement and management commitment. Each healthcare setting should have its own carefully tailored programme, developed with frontline worker input and review. Several studies document substantial reductions in needlestick injuries with the proper use of needleless systems or newer safety needle devices.

A case study of a successful comprehensive prevention programme is found in an examination of needlestick injuries in an acute-care community hospital in Greater Washington, DC, from 1990 to 1998. The study found that implementation of a multi-faceted intervention programme led to a significant and sustained decrease in the overall rate of sharps injuries. Annual sharps injury incidence rates decreased by 70 per cent, from 82 injuries per 1000 full-time workers to 24 injuries per 1000 full-time workers. In addition to the use of medical safety devices, the hospital's interventions included an intensive training effort, expanded employee health programmes, an expedited injury reporting process with a focus on confidentiality issues, an anti-needlesticks and sharps task force, and the implementation of new work practices.

Federal efforts to address the problem

Federal research on needlestick injuries is led by NIOSH, a research institute in the Centers for Disease Control and Prevention (CDC) mandated to conduct research to identify and prevent workplace safety and health hazards.



In addressing needlestick injuries, NIOSH works closely with the National Centers for Infectious Diseases (NCID), also part of CDC.

CDC has had a long-standing interest and involvement in the prevention of needlestick exposures, dating back to its 1987 guidelines for universal precautions that included recommendations for the safe handling of sharp devices, including proper disposal. In a 1998 report, CDC reviewed the proper location, use and benefits of sharps disposal containers, which play a key role in needlestick injuries. In 1999, after reviewing the available scientific research, CDC — with a broad range of reviews from diverse stakeholders — published a national *Alert* on 'Preventing Needlestick Injuries in Healthcare Settings,' which contains the public health recommendations discussed here. The *Alert* was distributed to every hospital in the country and its impact is being evaluated by CDC.

CDC is also currently funding and conducting a wide variety of extramural and intramural projects aimed at reducing the occurrence of needlestick injuries and exposure to blood-borne pathogens. An extramural project begun in 2000 will work to provide new data on healthcare workers who work outside of hospitals, reflecting the changing environment of healthcare delivery. CDC has also worked on a number of projects with universities to examine safety climate and work organisation factors that have an impact on needlestick injuries, and to evaluate training programmes for healthcare workers.

Also of note, coordinated national efforts to address needlestick injuries are occurring through Healthy People 2010, the US Department of Health and Human Service's national health promotion and disease prevention initiative, and the National Occupational Research Agenda (NORA™), a national research framework created and implemented by a broad group of stakeholders. Several of NORA's 21 priority research areas — including infectious diseases and intervention effectiveness research — are addressing needlestick injury issues.

Despite these efforts, there is a critical need for further research on needlestick injuries and their prevention. Because most of the medical devices are in the first generation stage, ongoing review of current devices and options will be necessary. Research will continue to improve the safety features of devices. Evaluation studies to provide improved information on what does and does not work will similarly continue to improve the effectiveness of comprehensive safety programmes. Because training for employers and healthcare workers is a vital part of a comprehensive prevention programme, especially as new and safer devices are introduced, model training curriculums need to be developed and evaluated at regular intervals. Additionally, there is a need to improve national surveillance and to build institutional capacity for measuring the impact of prevention efforts.

Regulation of needlestick injuries

The current federal standard for addressing needlestick injuries among healthcare workers is the Occupational Safety and Health Administration (OSHA) blood-borne pathogen standard. This, which has been in effect since 1992, applies to all occupational exposure to blood or other potentially infectious materials, and includes requirements such as a written exposure control plan, compliance with universal precautions, engineering controls, personal protective equipment and prohibition of recapping needles. In 1999, as part of a new emphasis on preventing needlestick injuries, OSHA updated its compliance directive on this standard to reflect new, safer technology and increase employers' responsibility to use it. There is now pending federal legislation that would strengthen OSHA's blood-borne pathogen standard by requiring hospitals to use safety devices and through other means.

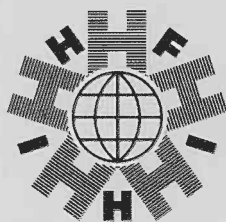
In terms of state regulations, currently 15 states have adopted — and more than a dozen are considering — legislation to require additional regulatory actions addressing blood-borne pathogen exposure to healthcare workers. The 1998 California standard has served as a model for many of these laws.

While knowledge of needlestick injuries and their prevention continues to grow, completed research indicates that such injuries are a significant and continuing cause of exposure to serious and sometimes fatal infections among healthcare workers. Prevention is best accomplished through a comprehensive programme that addresses institutional, behavioural and device-related factors that contribute to the occurrence of needlestick injuries in healthcare workers. Critical to this effort is the elimination of needle use where safe and effective alternatives are available, and the continuing development, evaluation and use of needle devices with safety features. All such approaches must include serious initial and ongoing training efforts. Monitoring systems are also needed to provide accurate information on the magnitude of needlestick injuries and trends over time, potential risk factors, emerging new problems and the effectiveness of interventions in all healthcare settings. +



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