

IV Catheter Needlestick Prevention

10 years of needlestick prevention
in USA – Where are we today?



Frequency

Ouch, a little needlestick can change your life for ever!

How many times does this injury in hospitals and out patient areas occur?

Literature reports the following data:

- 400,000 – 800,000 hospital needlestick injuries (NSI) occur in the USA each year. (1, 2)
- That means, that 30 needlestick injuries occur per 100 hospital beds per year. (3, 4) Or, every 30 – 45 seconds a US Health Care Worker sustains a needlestick injury.
- Unfortunately there is a tendency to under-report. The rate of non-reporting professional groups amount to 30% – 60% for nurses, 92% for laboratory personal, and 70% – 95% for physicians. (5)
- An OSHA report from 2001 shows that approximately 62% – 88% of the estimated needlestick injuries are preventable through technology.

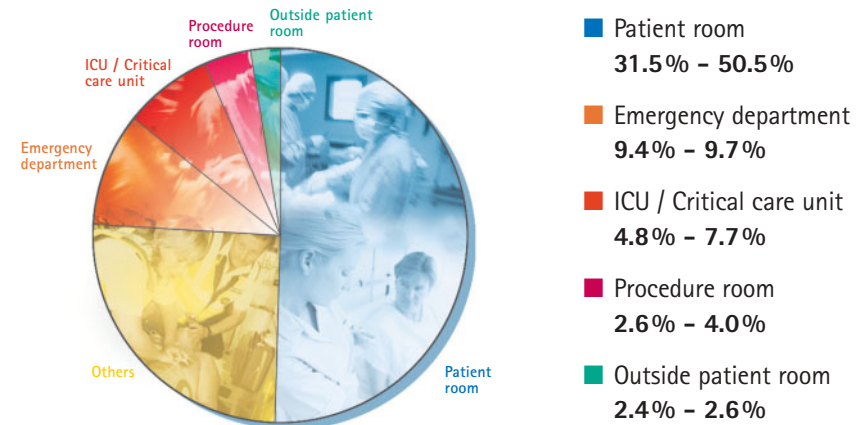
Risk groups and the situation where needlesticks mostly occur:

Health care workers like nursing staff, physicians and laboratory staff are on top of the risk scale to sustain a needlestick with hollow-bore, and blood contaminated, needles.

There are significant differences between teaching and non teaching hospitals (26% : 18%), i.e. new staff or students tend to have more needlestick injuries than experienced staff. (6)

Other vulnerable hospital groups are the housekeeping and laundry staff. There is an interesting EPINet report 2001(7) from Perry, Parker and Jagger showing significant statistical data.

Areas where needlestick injuries mostly occur.



In case of an injury 90.7% – 96.7% of the source patients are identifiable. The rest risk of a non identifiable or unknown patient is between 3% and 9%. Also the seroconversion status is unknown in nearly 10%.

When a needlestick injury occurs, 57.3% – 81.1% of the injured workers are the original users of the sharp item. 18.2% – 39.3% of the concerned persons are non-involved staff members.

Are these data satisfactory?

Every health care worker knows, that an increased risk of sharps-related injury is associated with rushing, anger, distraction, and multiple passes. A trend toward increased risk was seen when subjects were fatigued, working with an uncooperative patient, or working as a part of a team that was short staffed. (1) The most common procedure being carried out when an injury happened was an intramuscular or subcutaneous injection (22%).

Almost 20% happened during venepuncture or IV cannulation, both being defined as high risk procedure. (8)

Recapping accounts for 25% to 30% of all needlestick injuries of nursing and laboratory staff.

Transmission diseases

A little stick with a hollow-bore needle, and a small amount of blood, percutaneously administered, for example by a needlestick, can transmit more than 20 pathogens, viruses, bacteria and fungi.

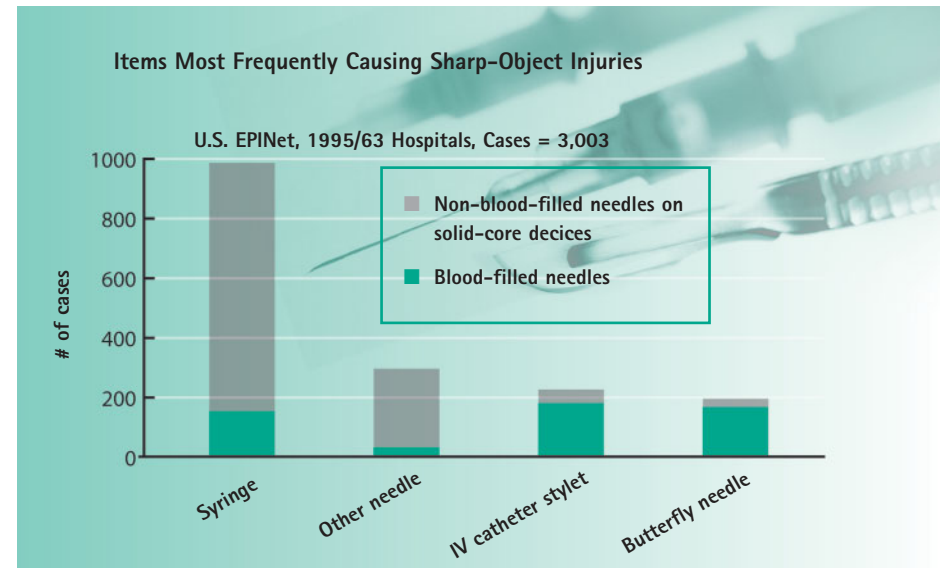
These pathogens are:

In succession of the risk incidence (6):

- Hepatitis B
- Hepatitis C
- HIV
- Malaria
- Syphilis
- Tuberculosis
- others
- Rocky Mountain spotted fever
- Toxoplasmosis
- Brucellosis
- Herpes
- Diphtheria
- Blastomycosis
- Dengue Virus (9)

Most of these pathogens can change your life for ever, especially the first six!

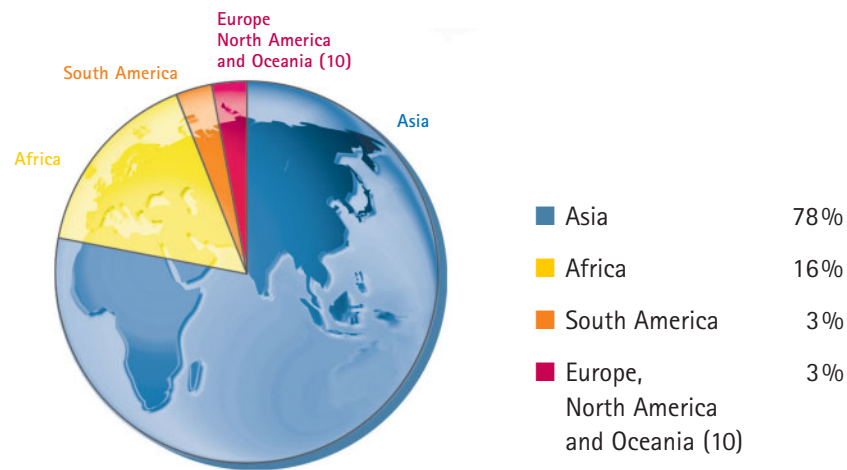
But, the seroconversion rate depends on needle depth, blood volume, present virus (bacteria, fungi) concentration and the patients phase of disease.



Hepatitis B virus infection (HBV):

CDC and WHO reports show that approximately 30% of the world's population, or about 2 billion persons have a serological evidence of a hepatitis B virus (HBV) infection.

More than 360 million have a chronic HBV infection, these people are located in:



5% to 10% of these patients develop a chronic infection with HBV estimating a 20% lifetime risk of dying from liver cirrhosis and a 6% risk of dying from liver cancer. (11, 12)

The seroconversion rate after percutaneous exposure, by virus concentration of $10^{8-9}/\mu\text{l}$, is **30 percent**.

Most of the US health care workers (HCW) are immune by vaccination. Since 1992 the risk of an HBV infection for HCW decreases by more than 88.3%.

If a needlestick injury occurs the possibility of a "Post exposure prophylaxis" (PEP), with immunoglobulin is available and most effective. (11, 13)



Hepatitis C virus infection (HCV):

170 million individuals in the world (3% worldwide) are infected with the Hepatitis C virus. (14)

In Western Europe and North America the seroprevalence rate of HCV is 1%, in some Mediterranean and Asia countries between 3% - 4%, and up to 10% - 20% in parts of Central Africa and Egypt. (13)

Hepatitis C virus infection is the most common chronic blood borne infection in the United States, affecting more than 4 million Americans, that is nearly 1.3% of the U.S. population (15)

A "CDC" statistic shows that the "HCV" infection often occurs without any symptoms or with mild symptoms only. 75% to 85% of the HCV infected patients are developing a chronic infection. 15% of HCV infected individuals simply have an acute infection, that is resolving spontaneously after a few weeks or months. From the patients that developed a chronic active liver disease, 10% to 20% develop a cirrhosis, and 1% to 5% develop liver cancer. (11)

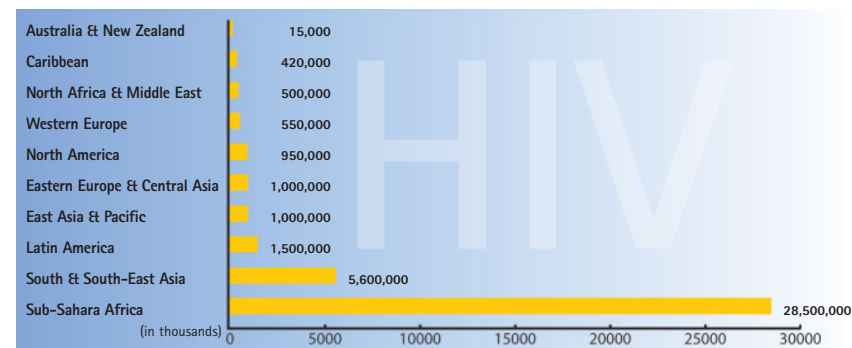
In the U.S. and Western Europe, the complications of HCV chronic hepatitis and cirrhosis are the most common reasons for liver transplantation. (14)

The seroconversion rate after percutaneous exposure, by virus concentration of $10^{3-4}/\mu\text{l}$, is **3 percent**. (16, 13)

A prevention or "Post exposure prophylaxis" (PEP) is currently not available, because no vaccine exists. In fact, neither an immunoglobulin nor antiviral therapy is recommended as PEP. (12, 11)

HIV:

The HIV infection rate is growing up to about 5 million people every year. The total number of adults and children living with HIV/Aids amounts to 40 million world wide. The continental allocation of HIV is as follows:



In 2001, 3 million died of AIDS. (17)

The seroconversion rate after percutaneous exposure, by virus concentration of $10^{8-9}/\mu\text{l}$, is **0.3 percent**. (13, 16, 11)

Currently no vaccine exists to prevent HIV infection.

After a needlestick injury the treatment with antiviral drugs is the ultimate chance. This "Post exposure prophylaxis" (PEP) has been discussed in litera

- PEP is the most effective treatment, it should be commenced as soon as possible after the exposure, and ideally within 1 h after injury. (18)
- HIV PEP with Zidovudine™ was associated with a 80% reduction of the infection risk. (19)

The CDC (Centre for Disease Control) reports that as of December 2001, there were 57 documented and as many as 138 possible cases of occupational HIV transmission to healthcare workers.

California's Occupational Safety and Health Administration performed a comprehensive cost analysis on the use of safety needles.

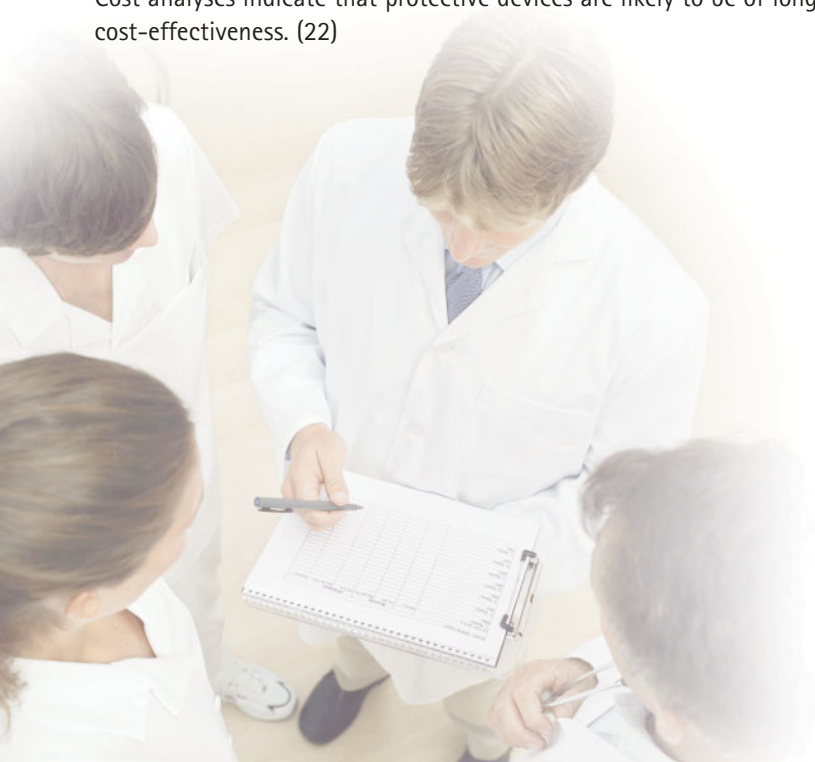
The report released in December 17, 1998, estimated that each needlestick involves costs for the employers of between \$ 2,234 and \$ 3,832, even when no infection occurs. (20, 4, 2)

The direct medical costs of the initial evaluation and treatment of sharps-related injuries to US health care workers are estimated to be approximately \$ 500 million (US) annually. (21)

Reduction of injury as a result of engineered sharps injury protective devices vary according to the thoroughness of training, perceptions of risk of percutaneous injury and blood-borne infection, as well as the level of training and motivation to use devices.

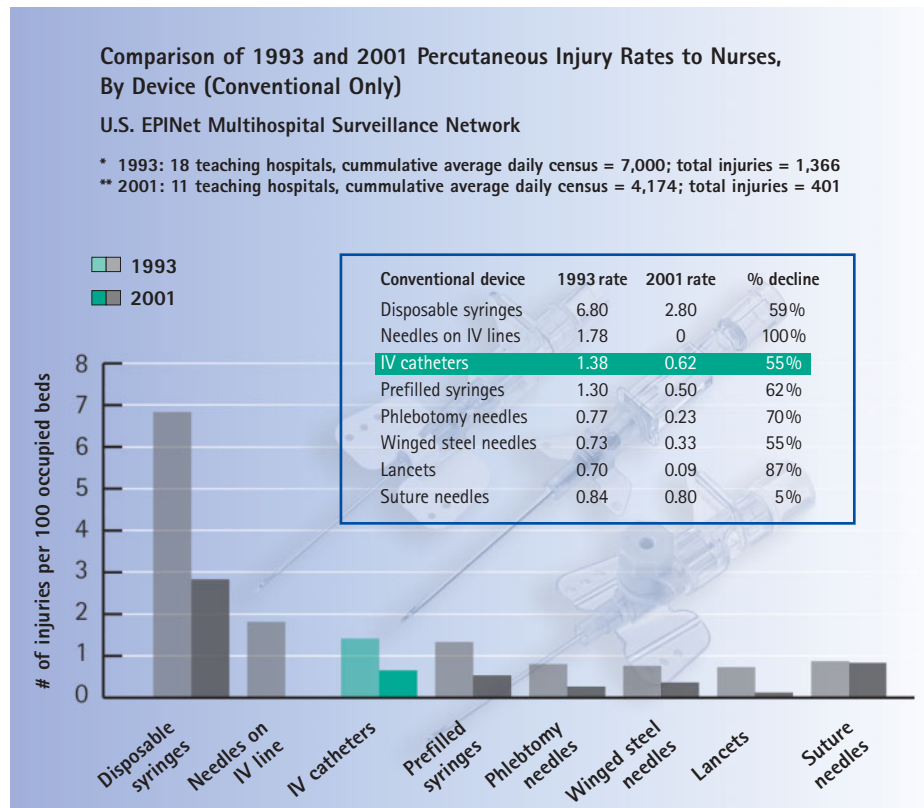
Cost analyses indicate that protective devices are likely to be of long-term cost-effectiveness. (22)

Needlestick involved
costs per employer
\$ 2,234 – \$ 3,832
without infection



The success of the "Safety IV catheters":

The EPINet data for 1993 and 2001 (7) "Marked Decline in Needle stick Injury Rates" (Jagger and Perry) report that percutaneous injuries (PI) from intravenous (IV) catheter decrease by **55%**.



Are safety IV catheter safe enough?

Despite "safer" sharps devices being made available and used, they are often not adequately activated. (22)

In fact, the 2001 EPINet report (7) states that **71.1%** of needlestick injuries occurred due to non activation of the safety mechanism.

An additional 16.8% of the devices left health care workers unprotected by only partial activation, and 12.1% by fully activated mechanisms.

Almost 90% of safety devices causing injuries involved safety mechanisms that were either bypassed or incorrectly activated.

An other interesting result from the EPINet 2001 report (7) is, that if a needlestick injury occurs 56.9% had happened before activation, 26.3% during activation and 16.9% after activation of the safety device.

Accidents can still occur if instructions are not followed or if the device is not properly used and the safety mechanism is not activated. (23)

In site visits to 79 hospitals to evaluate compliance, one study found many cases of employees who were stuck by safety devices. "They thought they were activated, and they weren't. Or they were improperly activated." (24)

There will be some residual needlesticks that occur during use, and needlesticks can occur with safety devices, especially ones where the safety device is not activated. "In terms of continuing to develop better safety devices ... more passive devices should be considered." (25)

In a recent, survey healthcare workers bypass safety mechanisms because they:

- Are not familiar with how the features work
- Consider mechanisms an interference to their technique
- Do not take the time to activate them during emergencies (26)

In one study, 90% of the staff was non-compliant with using the safety feature of an active needle safety device. (27)

In this same study, 72% of devices retrieved, from randomly selected disposal containers, had not been activated. (27)

This study concluded that, "... education alone was not sufficient to encourage people (to activate safety devices). Truly good protective systems should be passive so they don't have to worry about changing technique. (28)

In one study, 61% of safety IV catheter needlestick injuries were caused by improved activation or nonactivation of user-activated devices. (29)

So our answer is:

Not every safety IV catheter is safe enough.

The used safety technology of different brands has wide influence on reliable protection against needlestick injuries.

Passive better than active!

There are two types of safety IV catheters: active and passive. An active safety catheter requires the user to activate the safety mechanism manually. For example, the nurse may need to push a button or slide a plastic sheath to cover the contaminated needle.

A passive device requires no action by the user. An IV catheter that shields the tip of the needle on removal from the patient's vein, without activation by the user, is an example of passive safety design.

OSHA (Occupational Safety & Health Administration): Passive Safety features remain in effect before, during, and after use; workers do not have to activate them. Active devices require the worker to activate the safety mechanism. Failure to do so leaves the worker unprotected. (30)

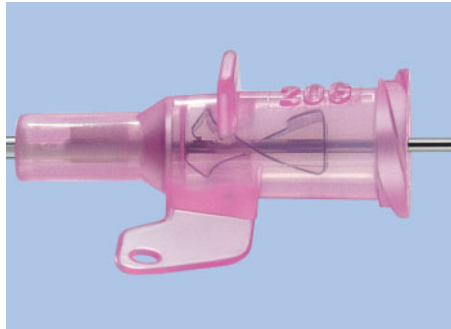
APIC (Association for Professionals In Infection Control und Epidemiology): Preventive devices (products with features designed to prevent needlestick injuries) fall broadly into two categories: Those providing "passive," or automatic, protection, and those with a safety mechanism that must be activated by the user. Several studies have found that devices providing passive protection are both more effective und more acceptable to healthcare workers than those that require the user to activate the safety feature. (31)

NIOSH (National Institute for Occupational Safety and Health): Desirable characteristics of devices with safety features include the following: The safety feature is an integral part of the device, and the device preferably works passively (i.e., it requires no activation by the user). (32)

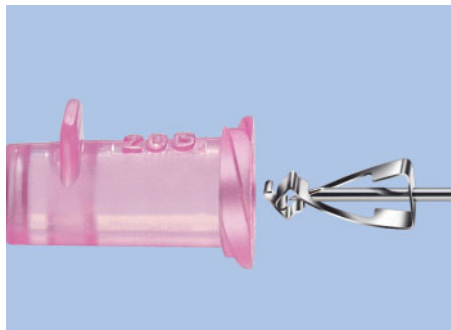


It's new. It's safer.

Vascular Access



The Passive Safety Technology of Introcan Safety® IV Catheter is designed to make it safe when you remove the needle from the catheter.



The patented Safety Clip mechanism, located in catheter hub, engages the needle bevel by attaching to, and shielding, it during removal.

Passive Safety features enhance safety and more likely to have a greater impact on needlestick prevention. (30)

With the Introcan Safety® IV Catheter passive design, in-service time is minimal because there is no modification of IV insertion technique. Decreased costs associated with staff training will enable healthcare providers to comply with legislative requirements in a more timely and cost-effective manner. (33)

In a study, the passive Introcan Safety® IV Catheter resulted in zero needlesticks (Injury Rate - 0/87,000; $p=0.07$), resulting in "a trend towards significance in reducing injuries with the Introcan Safety®." (34)



The new B. Braun shielded IV catheters combine optimum protection against needlestick injuries and related infections with well-established handling properties.

Life is full of risks. Healthcare teams who routinely work with hollow-bore needles and catheters are exposed to a higher risk of needlestick injuries and accidental transmission of serious infections.

The new shielded IV catheters from B. Braun herald the latest generation of superior catheters combining optimum safety with established handling properties.

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SHARING EXPERTISE

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