

## EPINet Report:

# 2001 Percutaneous Injury Rates

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In 2001, THE INTERNATIONAL HEALTHCARE Worker Safety Center at the University of Virginia collected data on percutaneous injuries and blood and body fluid exposures from 58 healthcare facilities in the United States that use the EPINet surveillance program to track exposure incidents. These facilities voluntarily participate in the collaborative EPINet network coordinated by the Center, and their exposure data are combined into an aggregate database. The 2001 percutaneous injury report and blood and body fluid exposure report are presented on pages 33 and 34, and a list of the facilities that contributed data can be found on page 31.

Forty-three of these facilities are part of a state-wide network in South Carolina coordinated by Palmetto Hospital Trust Services; nine facilities are members of the Sisters of Providence network in the Pacific Northwest; the other six facilities are located in the eastern half of the U.S., except for St. Joseph Hospital in Omaha, Nebraska. Thirteen of the facilities are teaching hospitals, and 45 are nonteaching hospitals. In 2001, 33 facilities had an average daily census (ADC) of less than 100 occupied beds\*; 12 facilities had an ADC of 100 to 300; and 11 facilities had an ADC of greater than 300. Most of the facilities are acute-care or tertiary-care hospitals or medical centers, some of which have physi-

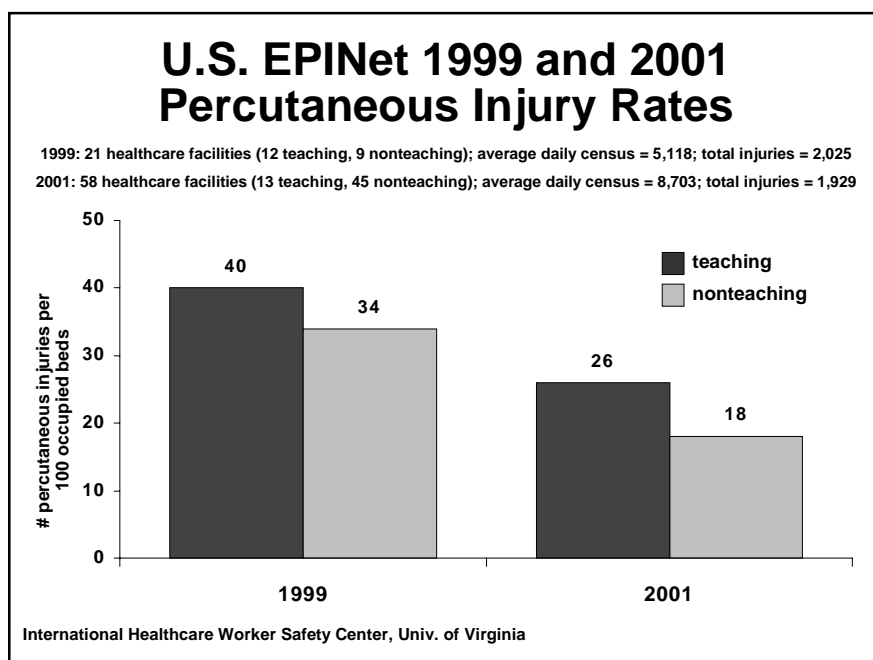
cians' offices, home health agencies and other outpatient settings affiliated with them. Among the participating facilities is an alcohol and drug abuse agency with a detoxification unit, a home hospice agency, a long-term acute-care facility, a skilled nursing facility, and a rehabilitation hospital.

By comparison, in 1999 the average PI rate for teaching hospitals was 40 per 100 occupied beds, and for nonteaching facilities, 34 per 100 occupied beds. Twenty-one facilities reported data in 1999; the total number of PIs was 2,025. (Most of the hospitals that were added into the network between 1999 and 2001 were small nonteaching hospitals.)

The decline in PI rates for 2001 compared to 1999 may be attributed to several factors. Foremost is the increased use of safety devices, especially since OSHA issued a revised compliance directive for the Bloodborne Pathogens Standard in November 1999 which explicitly stated, for the first time, that use of safety de-

vices was required. Other factors that may have contributed to the decline in PI rates include better education of healthcare workers about the risks associated with sharps injuries (which in turn helps to lessen resistance to use of safety devices) and increased training in the proper use of safety devices. Also, injuries from needles used to access intravenous lines appear to have been nearly eliminated: in 1999, 1% of injuries involved needles used for this purpose; in 2001, that figure had declined to 0.3%.

EPINet data from 2001, as in previous years, revealed great variation among individual facilities in PI rates:



In 2001, a total of 1,929 percutaneous injuries (PIs) were reported by network facilities. The 2001 data yielded these findings:

- The average percutaneous injury (PI) rate for teaching hospitals was 26 injuries per 100 occupied beds.
- The average PI rate for nonteaching facilities was 18 injuries per 100 occupied beds.
- The average PI rate for hospitals with an ADC of less than 100 was 22.79 per 100 occupied beds; for hospitals with an ADC of 100-300, 25.82 per 100 occupied beds; and for hospitals with an ADC of greater than 300, 19.85 per 100 occupied beds.

(\* "Occupied beds" is defined as the ADC for the same year in which the data were collected.)

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# Uniform Needlestick and Sharp-Object Injury Report U.S. EPINet Network, 2001, 58 healthcare facilities\*

Total cases=1,929 (excluding injuries before use); total avg. daily census = 8,703 (\*13 teaching/45 nonteachinghospitals)

**JOB CATEGORY:**

M.D. (attending/staff)	152	8.1%
M.D. (intern/resident/fellow)	124	6.6%
Medical student	13	0.7%
Nurse RN/LPN	818	43.6%
Nursing student	12	0.6%
Respiratory therapist	29	1.5%
Surgery attendant	166	8.8%
Other attendant	27	1.4%
Phlebotomist/venipuncture/ I.V. team	111	5.9%
Clinical laboratory worker	36	1.9%
Technologist (non-lab)	90	4.8%
Dentist	2	0.1%
Dental hygienist	0	0%
Housekeeper	64	3.4%
Paramedic	7	0.4%
CNA/HHA	48	2.6%
Laundry worker	2	0.1%
Security	2	0.1%
Other student	26	1.4%
Other	148	7.9%

**WHERE INJURY OCCURRED:**

Patient room	592	31.5%
Outside patient room	45	2.4%
Emergency department	176	9.4%
Intensive/critical care unit	91	4.8%
Operating room	541	28.8%
Outpatient clinic/office	91	4.8%
Blood bank	1	0.1%
Venipuncture	16	0.9%
Dialysis facility	13	0.7%
Procedure room	76	4.0%
Clinical laboratories	34	1.8%
Autopsy/pathology	14	0.7%
Service/utility area	28	1.5%
Labor and delivery	38	2.0%
Home-care	26	1.4%
Other	97	5.2%

**ORIGINAL PURPOSE OF SHARP ITEM:**

Unknown, N/A	148	7.9%
Injection, IM/subcutaneous	390	20.9%
Heparin or saline flush	32	1.7%
Other injection/aspiration I.V.	83	4.4%
Connect I.V. line	16	0.9%
Start I.V. or heparin lock	91	4.9%
Draw venous blood sample	295	15.8%
Draw arterial blood sample	41	2.2%
Obtain body fluid/tissue sample	29	1.6%
Fingerstick/heel stick	43	2.3%
Suturing	324	17.3%
Cutting (surgery)	145	7.8%
Electrocautery	9	0.5%
Contain specimen/pharmaceutical	10	0.5%
Place arterial line	24	1.3%
Drilling	12	0.6%
Other	177	9.5%

**WHEN INJURY OCCURRED:**

During use of item	564	30.1%
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Between steps of multistep procedure	257	13.7%
Disassembling device	79	4.2%
Preparing instrument for reuse	36	1.9%
Recapping device	68	3.6%
Withdrawing from resistant material	67	3.6%
Other after use, before disposal	314	16.8%
Item left on disposal container	12	0.6%
Putting item into disposal container	122	6.5%
After disposal, item protruding from disposal container	53	2.8%
Pierced side of disposal container	5	0.3%
Item pierced side of inappropriate disposal container	39	2.1%
Restraining patient	10	0.5%
Device left on floor, table or other inappropriate place	116	6.2%
Other	130	6.9%

**TYPE OF DEVICE CAUSING INJURY:**

Disposable syringe	650	36.1%
Prefilled cartridge syringe	49	2.7%
Blood gas syringe	20	1.1%
Syringe, other type	14	0.8%
Needle on I.V. tubing	9	0.5%
Winged steel needle	120	6.7%
I.V. catheter (stylet)	65	3.6%
Vacuum tube blood collection needle	72	4.0%
Spinal or epidural needle	5	0.3%
Unattached hypodermic needle	17	0.9%
Arterial catheter introducer needle	10	0.6%
Central line catheter introducer needle	6	0.3%
Other vascular catheter needle	4	0.2%
Other non-vascular catheter needle	1	0.1%
Needle, unknown type	42	2.3%
Needle, describe	65	3.6%
Lancet	40	2.2%
Suture needle	307	17.0%
Scalpel, reusable	77	4.3%
Razor	6	0.3%
Scissors	14	0.8%
Bovie electrocautery device	9	0.5%
Bone cutter	6	0.3%
Towel clip	4	0.2%
Microtome blade	6	0.3%
Trocar	2	0.1%
Vacuum tube, plastic	1	0.1%
Fingernails/teeth	4	0.2%
Scalpel, disposable	48	2.7%
Retractors, skin/bone hooks	14	0.8%
Staples/steel sutures	3	0.2%
Wire	15	0.8%
Pin	11	0.6%
Drill bit	3	0.2%
Pickups/forceps/hemostats	8	0.4%
Sharp item, not sure what kind	8	0.4%
Other sharp item (describe)	44	2.4%
Medication ampule	1	0.1%
Vacuum tube, glass	4	0.2%

Specimen/test tube, glass	5	0.3%
Capillary tube	1	0.1%
Glass slide	2	0.1%
Glass item, unknown type	2	0.1%
Other glass item	9	0.5%

**SOURCE PATIENT IDENTIFIABLE?**

Yes	1704	90.7%
No	122	6.5%
Unknown	46	2.4%
Not available	7	0.4%

**INJURED WORKER ORIGINAL USER OF SHARP ITEM?**

Yes	1066	57.3%
No	731	39.3%
Unknown	35	1.9%
N/A	29	1.6%

**SHARP ITEM CONTAMINATED?**

Yes	1689	90.3%
No	28	1.5%
Unknown	154	8.2%

**IF INJURY WAS CAUSED BY A NEEDLE, WAS IT A SAFETY DESIGN?**

Yes	393	22.4%
No	1260	71.8%
Unknown	103	5.9%

**IF YES, WAS SAFETY MECHANISM ACTIVATED?**

Yes, fully	44	12.1%
Yes, partially	61	16.8%
No	258	71.1%

**IF YES, DID INJURY HAPPEN:**

Before activation	182	56.9%
During activation	84	26.3%
After activation	54	16.9%

**DEPTH OF INJURY:**

Superficial (little/no bleeding)	891	49.0%
Moderate (skin punctured, some bleeding)	854	46.9%
Severe (deep stick/cut, profuse bleeding)	75	4.1%

**BODY PART INJURED:**

Arm	46	2.5%
Back	2	0.1%
Face/head	5	0.3%
Foot	7	0.4%
Front	5	0.3%
Hand, left	1011	55.8%
Hand, right	715	39.4%
Leg	22	1.2%

**GLOVES—Did sharp item penetrate:**

Single pair of gloves	1210	68.9%
Double pair of gloves	210	12.0%
No gloves	335	19.1%

**TYPE OF FACILITY:**

Non-teaching hospital	703	37.2%
Teaching hospital	1185	62.8%

**NOTE:** The needlestick and sharp-object injury report and blood and body fluid exposure report that appear on this page and the next are based on 2001 data from the EPINet data-sharing network coordinated by the International Healthcare Worker Safety Center at the University of Virginia. (A list of hospitals participating in the network appears on page 31.)

# Uniform Blood and Body Fluid Exposure Report U.S. EPINet Network, 2001, 49 health care facilities\*

Total cases=463; total avg. daily census = 7,716 (\*37 teaching/12 nonteaching hospitals)

## JOB CATEGORY:

M.D. (attending/staff)	25	5.4%
M.D. (intern/resident/fellow)	25	5.4%
Medical student	1	0.2%
Nurse RN/LPN	250	54.2%
Nursing student	3	0.7%
Respiratory therapist	16	3.5%
Surgery attendant	23	5.0%
Other attendant	5	1.1%
Phlebotomist/venipuncture/ I.V. team	5	1.1%
Clinical laboratory worker	12	2.6%
Technologist (non-lab)	31	6.7%
Housekeeper	4	0.9%
Paramedic	7	1.5%
Other student	5	1.1%
CNA/HHA	17	3.7%
Other, describe	32	6.9%

## WHERE EXPOSURE OCCURRED:

Patient room	175	37.8%
Outside patient room	9	1.9%
Emergency department	61	13.2%
Intensive/critical care unit	34	7.3%
Operating room	81	17.5%
Outpatient clinic/office	8	1.7%
Blood bank	3	0.6%
Venipuncture	1	0.2%
Dialysis facility	1	0.2%
Procedure room	31	6.7%
Clinical laboratories	7	1.5%
Service/utility area	2	0.4%
Labor and delivery	8	1.7%
Home-care	6	1.3%
Other, describe	36	7.8%

## BBF<sup>†</sup> INVOLVED IN EXPOSURE:

(more than one item can be checked)<sup>‡</sup>

Blood or blood products	332	71.7%
Vomit	10	2.2%
Sputum	36	7.8%
Saliva	29	6.3%
Cerebro-spinal fluid	2	0.4%
Peritoneal fluid	3	0.6%
Pleural fluid	6	1.3%
Amniotic fluid	12	2.6%
Urine	23	5.0%
Other body fluid	50	10.8%

<sup>†</sup>BBF = blood or body fluids

<sup>‡</sup>Because more than one item can be checked in this category, percentages total more than 100%.

## WAS THE BODY FLUID, OTHER THAN BLOOD, VISIBLY CONTAMINATED WITH BLOOD?

Yes	220	67.1%
No	81	24.7%
Unknown	27	8.2%

## EXPOSED PART(S):

(more than one item can be checked)<sup>‡</sup>

Intact skin	187	40.4%
Non-intact skin	82	17.7%
Eyes (conjunctiva)	268	57.9%
Nose (mucosa)	7	1.5%
Mouth (mucosa)	37	8.0%
Other exposed parts	12	2.6%

## DID THE BLOOD OR BODY FLUID:

(more than one item can be checked)<sup>‡</sup>

Touch unprotected skin	355	82.9%
Touch skin through gap between protective garments	48	11.2%
Soak through protective garment	13	3.0%
Soak through clothing	12	2.8%

## BARRIER ITEMS WORN AT TIME OF EXPOSURE:

(more than one item can be checked)<sup>‡</sup>

Single pair latex/vinyl gloves	283	61.1%
Double pair gloves	28	6.0%
Goggles	18	3.9%
Eyeglasses (not protective)	50	10.8%
Eyeglasses with sideshields	2	0.4%
Faceshield	13	2.8%
Surgical mask	42	9.1%
Surgical gown	39	8.4%
Plastic apron	2	0.4%
Lab coat, cloth (not protective)	25	5.4%
Lab coat, other	4	0.9%
Other item	50	10.8%

## CAUSE OF EXPOSURE:

Direct patient contact	218	47.7%
Specimen container leaked/ spilled	21	4.6%
Specimen container broke	10	2.2%
IV tubing/bag/pump leaked	38	8.3%
Other body fluid container spilled/leaked	23	5.0%
Touched contaminated equipment/surface	5	1.1%
Touched contaminated drapes/ sheets, gown	3	0.7%

## Feeding/ventilator/other tube

separated/leaked/spilled	45	9.8%
Other, describe	89	19.5%
Unknown	5	1.1%

## SOURCE PATIENT IDENTIFIABLE?

Yes	427	96.6%
No	12	2.7%
Unknown	3	0.7%

## LENGTH OF TIME BBF IN CONTACT WITH SKIN OR MUCOUS MEMBRANES:

Less than 5 minutes	357	80.8%
5-14 minutes	49	11.1%
15 minutes-1 hour	30	6.8%
More than 1 hour	6	1.4%

## AMOUNT OF BBF THAT CAME IN CONTACT WITH SKIN OR MUCOUS MEMBRANES:

Small amount (up to 5 cc)	387	88.4%
Moderate amount (up to 50 cc)	37	8.4%
Large amount (more than 50 cc)	14	3.2%

## EXPOSURE LOCATION

### Largest exposure:

Arm	23	5.3%
Face/head	305	70.9%
Front	9	2.1%
Hand, left	26	6.0%
Hand, right	61	14.2%
Leg	6	1.4%

### Medium-sized exposure:

Arm	11	5.5%
Face/head	138	69.3%
Foot	1	0.5%
Front	20	10.1%
Hand, left	10	5.0%
Hand, right	17	8.5%
Leg	2	1.0%

### Smallest exposure:

Arm	11	25.0%
Face/head	10	22.7%
Front	7	15.9%
Hand, left	11	25.0%
Hand, right	3	6.8%
Leg	2	4.5%

## TYPE OF FACILITY:

Non-teaching hospital	193	41.7%
Teaching hospital	270	58.3%

## 2001 Percutaneous Injury Rates (Continued from page 32)

six facilities had a zero PI rate, while three facilities had rates between 50 and 60 per 100 occupied beds. We do not fully understand the reasons for such variation, but they may include the mix of patients, injury underreporting rates, the extent to which a facility has converted to

safety devices, and whether it is a teaching or nonteaching institution.

Because of these variables, we cannot assume that a healthcare facility with a low PI rate necessarily has a better safety record than a hospital with a higher rate. For example, a hospital with a high PI rate may educate its employees about the need to report needlestick injuries,

or may have more patients requiring invasive procedures than another facility with a lower rate. For that reason, comparing rates between hospitals may not be very meaningful. It is more reliable to track injury trends within a single institution over several years, and make historical comparisons as prevention measures are implemented.

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# Needlestick and Sharp-Object Injury Report, EPINet 2001, 58 Healthcare Facilities\*, Injuries from Safety Devices Only

Total cases = 393 (excluding injuries before use); total avg. daily census = 8,703 (\*13 teaching/45 nonteaching hospitals)

## JOB CATEGORY:

M.D. (attending/staff)	4	1.0%
M.D. (intern/resident/fellow)	5	1.3%
Nurse RN/LPN	240	61.1%
Nursing student	4	1.0%
Respiratory therapist	5	1.3%
Surgery attendant	7	1.8%
Other attendant	7	1.8%
Phlebotomist/venipuncture/ I.V. team	53	13.5%
Clinical laboratory worker	9	2.3%
Technologist (non-lab)	9	2.3%
Housekeeper	6	1.5%
CNA/HHA	18	4.6%
Security	1	0.3%
Other student	3	0.8%
Other	22	5.6%

## WHERE INJURY OCCURRED:

Patient room	198	50.5%
Outside patient room	10	2.6%
Emergency department	38	9.7%
Intensive/critical care unit	30	7.7%
Operating room	29	7.4%
Outpatient clinic/office	19	4.8%
Venipuncture	8	2.0%
Dialysis facility	4	1.0%
Procedure room	10	2.6%
Clinical laboratories	6	1.5%
Autopsy/pathology	2	0.5%
Service/utility area	1	0.3%
Labor and delivery	5	1.3%
Home-care	11	2.8%
Other	21	5.4%

## ORIGINAL PURPOSE OF SHARP ITEM:

Unknown, N/A	11	2.8%
Injection, IM/subcutaneous	99	25.2%
Heparin or saline flush	11	2.8%
Other injection/aspiration I.V.	18	4.6%
Connect I.V. line	1	0.3%
Start I.V. or heparin lock	44	11.2%
Draw venous blood sample	153	38.9%
Draw arterial blood sample	12	3.1%
Obtain body fluid/tissue sample	4	1.0%
Fingerstick/heel stick	16	4.1%
Suturing	3	0.8%
Cutting (surgery)	5	1.3%

Contain specimen/pharmaceutical	1	0.3%
Other, describe	15	3.8%

## WHEN INJURY OCCURRED:

During use of item	126	32.2%
Between steps of multistep procedure	24	6.1%
Disassembling device	12	3.1%
In preparation for reuse of reusable instruments	1	0.3%
Recapping used needle	15	3.8%
Withdrawing from resistant material	16	4.1%
Other after use, before disposal	100	25.6%
Item left on or near disposal container	3	0.8%
Putting item into disposal container	27	6.9%
After disposal, stuck by item pro- truding from disposal container	11	2.8%
After disposal, item protruding from trash bag or inappropriate waste container	2	0.5%
Restraining patient	1	0.3%
Device left on floor, table, bed or other inappropriate place	16	4.1%
Other, describe	37	9.5%

## TYPE OF DEVICE CAUSING INJURY:

Disposable syringe	197	51.3%
Prefilled cartridge syringe	5	1.3%
Blood gas syringe	2	0.5%
Syringe, other type	2	0.5%
Winged steel needle	70	18.2%
I.V. catheter (stylet)	27	7.0%
Vacuum tube blood collection holder/needle	39	10.2%
Unattached hypodermic needle	2	0.5%
Needle, unknown type	1	0.3%
Needle, describe	13	3.4%
Lancet	16	4.2%
Suture needle	3	0.8%
Scalpel, reusable	4	1.0%
Microtome blade	1	0.3%
Scalpel, disposable	1	0.3%
Pin	1	0.3%

## SOURCE PATIENT IDENTIFIABLE?

Yes	377	96.7%
No	9	2.3%

Unknown	3	0.8%
Not available	1	0.3%

## INJURED WORKER ORIGINAL USER OF SHARP ITEM?

Yes	317	81.1%
No	71	18.2%
Unknown	3	0.8%

## SHARP ITEM CONTAMINATED?

Yes	370	94.4%
No	2	0.5%
Unknown	20	5.1%

## WAS SAFETY MECHANISM ACTIVATED?

Yes, fully	44	12.1%
Yes, partially	61	16.8%
No	258	71.1%

## IF YES, DID INJURY OCCUR:

Before activation	182	56.9%
During activation	84	26.3%
After activation	54	16.9%

## DEPTH OF INJURY:

Superficial (little/no bleeding)	181	46.9%
Moderate (skin punctured, some bleeding)	191	49.5%
Severe (deep stick/cut, profuse bleeding)	14	3.6%

## BODY PART INJURED:

Arm	5	1.3%
Back	1	0.3%
Foot	1	0.3%
Front	2	0.5%
Hand, left	212	55.6%
Hand, right	156	40.9%
Leg	4	1.0%

## GLOVES—Did sharp item penetrate:

Single pair of gloves	286	74.9%
Double pair of gloves	10	2.6%
No gloves	86	22.5%

## TYPE OF FACILITY:

Non-teaching hospital	177	45.0%
Teaching hospital	216	55.0%

## 2001 Percutaneous Injury Data for Safety Devices

The Needlestick and Sharp-Object Injury (SOI) report on this page provides 2001 data on PIs involving safety devices. It is important to note that, while PIs can still occur with safety devices—either during use or, if the safety mechanism is not activated, after use—the widespread implementation of safety devices over the last decade (and concomitant decrease in the use of conventional devices) has contributed

to a marked decline in percutaneous injury rates overall (see article, p. 25).

A comparison of 2001 data for safety devices with the overall 2001 sharp-object injury data (safety and conventional devices combined) shown on page 33 yields some interesting findings. Perhaps most striking is that, while nurses sustained 43.6% of PIs overall, in the safety device data they sustained 61%—probably because they handle the majority of safety devices in hospital settings. By contrast, while physi-

cians sustained 14.7% of PIs in the overall data, they sustained only 2.3% in the safety device data. That is because physicians, in contrast to nurses, handle a relatively small proportion of safety devices (conventional, sharp-tip suture needles cause about 35% of injuries to physicians overall).

After nurses, phlebotomists have the highest proportion of PIs (13.5%) from safety devices, which is more than twice the fraction of injuries for phlebotomists in the overall 2001 data (5.9%). This may

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## 2001 Percutaneous Injury Data for Safety Devices

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be attributed to the fact that most hospitals have made implementation of safety phlebotomy devices a priority, because blood-drawing and I.V. catheter placement are the highest-risk procedures for bloodborne pathogen transmission. With a significant increase in the use of safety devices for blood drawing, the number of PIs from safety phlebotomy devices will increase (although the overall risk of sustaining a PI while performing phlebotomy has markedly declined).

In the safety device data, 50.5% of PIs occurred in patient rooms, compared to 31.5% in the overall data; this probably reflects the relatively higher proportion of nurses using safer devices. The next most-frequent place of injury with safety devices was the emergency department (9.7%), which was close to the percentage in the overall data, 9.4%. However, the low proportion of PIs from safety devices in the operating room (OR) setting (7.4%) contrasted sharply with the high proportion of injuries occurring in ORs in the overall data (28.8%). This likely reflects the generally low acceptance of safety devices in ORs. This is borne out when comparing data for suture needles: in the overall data, 17% of PIs involve suture needles, but in the safety device data, only 0.8% do.

The percentage of PIs that occurred while withdrawing a device from rubber or resistant material (as commonly occurs when transferring the contents of a syringe to a specimen tube) is slightly higher for safety devices (4.1%) compared to the overall data (3.6%). This suggests a misuse of safety syringes for blood drawing, which defeats the benefit of the safety feature.

In 56.9% of injuries from safety devices, the injury occurred before activation of the device, and in 26.3% of cases it occurred during activation.

In conclusion, we found that safety devices have resulted in important changes in the ways in which needlestick injuries occur. We also found that safety devices have resulted in marked reductions in PI rates. However, we still need to be vigilant about how safety devices are used, because it is clear that they can be misused. Continuing efforts should focus on compliance and on using safety devices in the safest possible way. □