Preventing percutaneous injuries among dental health care personnel

Jennifer L. Cleveland, DDS, MPH; Laurie K. Barker, MSPH; Eve J. Cuny, MS, RDA; Adelisa L. Panlilio, MD, MPH; and the National Surveillance System for Health Care Workers (NaSH) Group

Occupational transmission of bloodborne pathogens—such as HIV, hepatitis B virus and hepatitis C virus (HCV)—is a rare event in dental settings. During the last decade, the strategies used to reduce occupational exposure and transmission of bloodborne pathogens have included hepatitis B vaccination, standard (universal) precaution, and the implementation of interventions to reduce percutaneous or "sharps" injuries. These efforts have succeeded in reducing the frequency of bloodborne pathogen exposure. For example, observational studies and surveys indicate that percutaneous injuries among general dentists and oral surgeons occur less frequently than among general and orthopedic surgeons, and that these injuries decreased in frequency during the 1990s.[1-5] For example, dentists participating in the Health Screening Program at the 1987 Annual Session of the American Dental Association reported an average rate of 11.4 injuries per year. By 1993, this rate had decreased to 2.2 injuries per year.[1,3] Studies conducted at dental schools have reported injury rates even lower than those reported among practicing general

ABSTRACT

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Background. The Occupational Safety and Health Administration and the Centers for Disease Control and Prevention (CDC) recommend that health care personnel (HCP) adopt safer work practices and consider using medical devices with safety features. This article describes the circumstances of percutaneous injuries among a sample of hospital-based dental HCP and estimates the preventability of a subset of these injuries: needlesticks.

Methods. The authors analyzed percutaneous injuries reported by dental HCP in the CDC's National Surveillance System for Health Care Workers (NaSH) from December 1995 through August 2004 to describe the circumstances.

Results. Of 360 percutaneous injuries, 36 percent were reported by dentists, 34 percent by oral surgeons, 22 percent by dental assistants, and 4 percent each by hygienists and students. Almost 25 percent involved anesthetic syringe needles. Of 87 needlestick injuries, 53 percent occurred after needle use and during activities in which a safety feature could have been activated (such as during passing and handling) or a safer work practice used.

Conclusions. NaSH data show that needlestick injuries still occur and that a majority occur at a point in the workflow at which safety syringes—in addition to safe work practices and recapping systems—could contribute to injury prevention.

Clinical Implications. All dental practices should have a comprehensive written program for preventing needlestick injuries that describes procedures for identifying, screening and, when appropriate, adopting safety devices; mechanisms for reporting and providing medical follow-up for percutaneous injuries; and a system for training staff members in safe work practices and the proper use of safety devices.

Keywords. Dentistry; occupational exposure; safety devices; bloodborne pathogens; infection control.

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Dr. Cleveland is a dental officer/epidemiologist, Division of Oral Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, MS F-10, 4770 Buford Highway, Atlanta, Ga. 30341, e-mail "JLCleveland@cdc.gov". Address reprint requests to Dr. Cleveland.

Ms. Barker is a statistician, Division of Oral Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, Atlanta.

Ms. Cuny is the director of environmental health and safety, Department of Pathology and Medicine, University of the Pacific, Arthur A. Dugoni School of Dentistry, San Francisco.

Dr. Panlilio is a medical officer, Division of Healthcare Quality Promotion, National Center for Infectious Diseases, Centers for Disease Control and Prevention, Atlanta.

dentists and oral surgeons.[6-8] However, despite improvements in instrument design and work practices, needlesticks and other blood contacts continue to occur, placing health care personnel (HCP) at risk of experiencing infection and emotional distress, even when a serious disease is not transmitted.[9]

Most injury prevention efforts in health care settings have focused on hollow-bore needles, because these devices have been associated with an increased risk of HIV transmission among HCP.[10] Of the 57 documented cases of occupational HIV transmission to medical HCP (none were among dental personnel) reported to the Centers for Disease Control and Prevention (CDC) through December 2001, 51 (89 percent) involved a percutaneous exposure.[11] Of these 51 injuries, 45 (88 percent) were caused by hollow-bore needles; one-half of these needles had been used in a patient's vein or artery. Interventions aimed at preventing sharps injuries are based on a hierarchy of controls that categorizes and prioritizes prevention strategies. Primary methods used to prevent occupational percutaneous injuries include eliminating or reducing the use of needles and implementing engineering and work practice controls.[12] Engineering controls, which can eliminate or isolate injury hazards, include the use of sharps containers, needle-recapping devices and devices with safety features (for example, self-sheathing anesthetic needles and scalpels). Passive safety devices that do not require activation by the user are preferred over active devices.[13] Where engineering controls are not available or appropriate, work practice controls (for example, placing sharps containers close to point of use, not passing unsheathed needles between HCP, recapping needles with one hand, restricting use of fingers during administration of anesthetic) can result in safer behavior and prevent exposure.

Such interventions have successfully decreased percutaneous injuries among dentists in recent years, as evidenced by the declining frequencies of injuries.[1-8] In dentistry, needleless anesthetic delivery systems (jet-injection guns) are available but cannot deliver anesthetic solution deep enough to produce adequate anesthesia. These systems, though rarely used, target procedures such as root planing and scaling that require only numbing of superficial tissues. Most dental HCP administer anesthetic with reusable anesthetic syringes attached to single-use, small-bore (25- to 29-gauge) disposable needles. Therefore, reducing most needlesticks in dentistry will require the use of engineering controls or safer work practices rather than needleless devices.

Efforts to prevent percutaneous injuries and other occupational exposures to blood and other body fluids have resulted in a growing number of initiatives to ensure safe working conditions in health care settings. CDC's Healthcare Safety Challenge[14] and Healthy People 2010 objectives[15] call for the elimination or prevention of needlestick injuries among HCP. Initiatives such as these were promoted by the federal Needlestick Safety and Prevention Act of 2000, which mandated changes to the Occupational Safety and Health Administration's (OSHA's) bloodborne pathogen standard.[16] These changes clarify the requirements for employers to "document annually consideration and implementation of appropriate commercially available and effective safer medical devices designed to eliminate or minimize occupational exposure." The standard also states that employers must involve in this process employees who are responsible for "direct patient care." In 2003, CDC recommended that dental HCP "identify, evaluate, and select devices with engineered safety features at least annually and as they become available on the market."[17] Medical and dental offices are exempt from maintaining an official log of reportable injuries and illnesses (OSHA Form 300).[18] However, documenting the frequency and circumstances of injuries can be useful in identifying unsafe devices or work practices.

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Before the passage of the Needlestick Safety and Prevention Act of 2000, few dental devices incorporated safety features. Since the act became

ABBREVIATION KEY. CDC: Centers for Disease Control and Prevention. **FDA:** U.S. Food and Drug Administration. **HCP:** Health care personnel. **HCV:** Hepatitis C virus. **NaSH:** National Surveillance System for Health Care Workers. **NSHN:** National Safety Healthcare Network. **OSHA:** Occupational Safety and Health Administration.

effective, dental safety devices (for example, safer scalpels and anesthetic syringes) have been developed and marketed. OSHA requires that employers who have staff members at risk of sustaining percutaneous injuries caused by contaminated sharps consider the use of safety devices (where appropriate) or document in their exposure control plans that safety devices have been considered but are not a practical alternative to the traditional devices.[16]

Although several studies have estimated the frequency of percutaneous injuries among dental HCP,[1–8] few have described how and when these injuries occurred, identified which injuries may have been preventable with a safety device or safer work practice or evaluated the effectiveness of safety devices or safer work practices in reducing injuries.[19,20] To address the first two issues, we analyzed surveillance data from CDC's National Surveillance System for Health Care Workers (NaSH) to describe percutaneous injuries among dental HCP and to explore the preventability of a subset of these injuries: needlesticks. In addition to examining percutaneous injuries among dental HCP, this article provides guidance in developing an office safety program to prevent percutaneous injuries (Box 1), selecting dental safety products for local anesthetic administration (Box 2) and identifying resources that can aid in the identification, evaluation and selection of safer dental devices as they become available (Box 3).[12,13,21]

BOX 1

Steps for selecting and evaluating dental safety programs and devices.*

1. ASSIGN RESPONSIBILITY FOR COORDINATING THE PROCESS.

Identify a staff member who will
- identify available dental safety devices;
- organize staff education and training;
- coordinate screening and product evaluation;
- monitor safety performance;
- document all activities, as well as staff feedback, in a written exposure control plan.

2. IDENTIFY SAFETY DEVICES TO EVALUATE.

3. IDENTIFY AND SCREEN (BENCH TEST) DENTAL SAFETY DEVICES.

Identify specific brands and types of dental safety devices.
Review any published data regarding the safety and usability of the devices.
Include all types of staff members who will potentially use or handle the devices in the screening process.
Obtain product samples for all screeners.
Compare safety devices to traditional devices to determine whether they
- appear safe to use on patients.
- have safety features that protect dental health care personnel from needlesticks.
- are easy and practical to use.
- are compatible with other equipment.

Determine whether pilot testing the devices on patients is appropriate. If so, move to step 4; if not, document the consideration and screening of the devices in your exposure control plan. Do not use devices on patients without appropriate screening by the staff to ensure that the devices meet clinical and patient safety requirements.

4. EVALUATE DENTAL SAFETY DEVICES.

Choose a reasonable testing period (2-4 weeks).
Provide adequate training for all staff members who need it.
Monitor patient pilot testing and remove devices immediately if problems arise.
Involve all staff members who participated in the evaluation process in the decision to accept or reject new devices.

5. IMPLEMENT AND MONITOR THE USE OF NEW DENTAL SAFETY DEVICES THAT ARE DEEMED ACCEPTABLE.

Provide mechanisms for ongoing feedback.
Review safety performance periodically.
Document the screening and evaluation process annually in your exposure control plan.

Note: The Centers for Disease Control and Prevention has developed guidelines and two sample forms for screening and evaluating dental devices.[21] These forms have been pilot tested with focus groups of different types of dental health care providers, including end users and purchasers. Although these forms are specific to anesthetic syringes, they can be used for other types of safety devices (for example, self-sheathing scalpels) after some modification.

* Based on information from U.S. Centers for Disease Control and Prevention.[12,13,21]

METHODS

NaSH is a multicomponent system initiated by CDC in 1995 to monitor occupational exposures to blood and bloodborne viruses, vaccine-preventable diseases and tuberculosis in health care facilities (primarily hospitals).[22,23] Participating facilities collect information from HCP on percutaneous injuries and mucous membrane exposures. The dental HCP in this database likely are hospital-based oral surgeons, general dentists, hygienists,

BOX 2

Dental safety products for administration of local anesthetic.

DENTAL SAFETY SYRINGES

Ultra Safety Plus XL (Septodont, Cambridge, Ontario, Canada). Information available at: "www.septodont.ca/Septodont/english/product/anesthetic/accessories/pultre.html".

SAFETY NEEDLE THAT ATTACHES TO TRADITIONAL SYRINGES

Safe-Mate (MedPro, Lexington, Ky.). Information available at: "www. safe-mate.com".

SAFETY NEEDLE ATTACHED TO AN ANESTHETIC DELIVERY SYSTEM

The Wand anesthetic delivery handpiece (Milestone Scientific, Livingston, N.J.). Information available at: "www.milesci.com/dental/ products.phtml".

BOX 3

Additional resources on prevention of needlestick injuries.*

- Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. Safety and health topic: Bloodborne infectious diseases—HIV/AIDS, hepatitis B virus, and hepatitis C virus. Available at: "www.cdc.gov/ niosh/topics/bbp".
- Centers for Disease Control and Prevention. Sample screening and device evaluation forms. Available at: "www.cdc.gov/oralhealth/infectioncontrol/forms.htm".
- Centers for Disease Control and Prevention, Division of Healthcare Quality Promotion. Workbook for designing, implementing and evaluating a sharps injury prevention program. Available at: "www.cdc.gov/sharpssafety/".
- Dental Evaluation and Consultation Service (formerly the USAF Dental Investigation Service). Available at: "http://decs.nhgl.med.navy.mil".
- National Alliance for the Primary Prevention of Sharps Injuries. Available at: "www.nappsi.org".
- Occupational Safety and Health Administration. Safety and health topics: Bloodborne pathogens and needlestick prevention. Available at: "www.osha.gov/SLTC/bloodbornepathogens/index.html".
- U.S. Food and Drug Administration. MedWatch: The FDA safety information and adverse event reporting program. Available at: "www.fda.gov/medwatch".
- U.S. Food and Drug Administration (FDA), Center for Radiological Health. Medical device safety: FDA's resource for health care professionals on device recalls, alerts, and other safety information. Available at: "www.fda.gov/cdrh/medicaldevicesafety/index.html".
- University of Virginia Health System, International Health Care Worker Safety Center. List of safety-engineered sharps devices and other information. Available at: "www.healthsystem.virginia.edu/internet/epinet/safetydevice.cfm".

* All accessed Jan. 11, 2007.

dental assistants and students.

During the period from December 1995 through August 2004, 29 of 54 participating NaSH hospitals reported percutaneous injuries among dental HCP. We characterized these reports by the number and types of dental HCP, location where injuries occurred, type of device involved, timing of injury or needlestick in relation to use of the device, circumstances (that is, how the injury occurred), and type of dental procedure being performed at the time of the injury, as well as whether the injury occurred inside or outside the patient's mouth (Table 1 and Table 2 [page 174]).

For percutaneous injuries, we classified responses to the question "How did the injury occur?" into the following seven categories of circumstances (Table 2):

- category 1: manipulating a patient or needle/sharp;
- category 2: using a sharp instrument in the operative field (for example, suturing, incising);
- category 3: handling instruments (for example, passing, handling, cleaning, dismantling or disposing);
- category 4: colliding with a sharp object;
- category 5: disposing of an instrument;
- category 6: leaving a sharp in an unusual location;
- category 7: other/unknown.

For needlesticks, we estimated the proportion that might have been prevented with a safety syringe or safer work practice using criteria similar to those previously published.[24,25] Nonpreventable needlesticks (those in category 1) were those that could not have been prevented solely by use of a safety syringe because they occurred while a needle was being inserted or withdrawn or because a patient moved unexpectedly (that is, during these actions, the safety feature could not be activated). Preventable needlesticks (those in categories 3-6) might have been prevented had a safety syringe been used and the safety feature activated, or if a safer work practice (for example, retracting the cheek with instruments rather than fingers) had been used. Because the NaSH database does not collect specific information on which

work practices were being used at the time of the reported injury, we cannot estimate the potential impact of safer work practices on the preventability of needlesticks.

We analyzed descriptive data using Statistical Analysis System software (Version 9.0, SAS Institute, Cary, N.C.).

RESULTS

Of 18,584 percutaneous injuries reported by all HCP during the study period, 367 involved dental HCP. We excluded seven percutaneous injuries from our analysis: five involving clean instruments, one in which the location (labor and delivery) likely was miscoded, and one that occurred during activation of a safety device. Thus, 360 injuries were included in this analysis. The largest proportion occurred in outpatient clinic settings (68 percent) and the operating room (12 percent) (Table 1). Of percutaneous injuries reported by dental HCP, dentists reported 36 percent, oral surgeons 34 percent, dental assistants 22 percent, students 4 percent and hygienists 4 percent. Although many sharp devices were involved, four types (hollow-bore needles, suture needles, burs and scalpels) were responsible for nearly two-thirds (63 percent) of all injuries. Hollow-bore needles such as anesthetic syringe and winged-steel needles were the devices most frequently reported as being involved in injuries (31 percent) (Figure 1). Of 110 injuries with hollow-bore needles, anesthetic syringe needles accounted for the majority (80 percent).

More than one-half (57 percent) of injuries occurred during use of a dental device (Table 1), and the timing of the injury varied by device (Figure 2, page 175). Nearly 60 percent of needlesticks occurred after use of an anesthetic syringe; for scalpels, scalers and suture needles, 70 to 89 percent occurred during use. Injuries involving burs occurred equally during and after use. Regarding the circumstances of injuries, suturing (13 percent) was the most frequent circumstance reported, followed by manipulating a needle in the patient (10 percent), handling instruments (9 percent) and colliding with a sharp object (9 percent) (Table 2). No needlesticks were reported in categories 2 or 7.

In 195 of 360 injuries, information about the procedure during which the injury occurred and whether the injury occurred inside or outside the

TABLE 1

Characteristics of percutaneous injuries among dental health care personnel (HCP).

VARIABLE	% OF INJURIES	NO. OF INJURIES
Type of Dental HCP		
Dentist	36	130
Oral surgeon	34	122
Dental assistant	22	80
Student	4	15
Hygienist	4	13
TOTAL	**100**	**360**
Location Where Injuries Occurred		
Outpatient	68	244
Operating room	12	44
Jail unit ward	7	24
Other	13	48
TOTAL	**100**	**360**
Type of Device		
Hollow-bore needles	31	110
Suture needles	15	55
Burs	10	36
Scalpels	7	24
Scalers	5	19
Surgical elevators	5	15
Explorers	4	15
Wires	3	12
Other sharps	20	74
TOTAL	**100**	**360**
Timing of Injury		
During use	57	204
After use, before disposal	37	135
During or after disposal	5	18
Unknown	< 1	3
TOTAL	**100**	**360**
Type of Dental Procedure Performed		
Oral surgery	35	68
Restorative	19	37
Hygiene	13	26
Periodontal surgery	9	18
Other	24	46
TOTAL	**100**	**195**
Injury Inside/Outside Mouth		
Inside	39	76
Outside	55	107
Unknown	6	12
TOTAL	**100**	**195**

TABLE 2

Circumstances surrounding percutaneous injuries sustained by dental health care personnel.

CATEGORY	CIRCUMSTANCE	% OF INJURIES*	NO. OF INJURIES	% OF NEEDLE-STICKS*	NO. OF NEEDLE-STICKS
Nonpreventable					
1. While manipulating patient or needle/sharp	Patient's moving and jarring device	8	30	18	16
	Inserting or withdrawing a needle	10	36	29	25
	Suturing	13	46	0	0
2. While in operative field	Incising	3	10	0	0
	Palpating/exploring	5	19	0	0
Preventable					
3. Handling instruments	Passing or transferring instruments	6	23	3	3
	Handling instruments on a tray	9	32	6	5
	Recapping	6	21	18	16
	Disassembling a device	6	20	11	10
	Activating a safety device	< 1	1	1	1
	Decontaminating	4	12	0	0
	During cleanup	6	23	6	5
	In transit to disposal	< 1	1	0	0
4. Collision	Colliding with sharp object	9	33	3	3
5. Disposal-related	Placing sharp in container	< 1	2	2	2
6. Sharp in unusual location	Sharps container being overfilled	< 1	1	1	1
	In trash	< 1	1	0	0
	Left on table or tray	2	6	1	1
	Other unusual location	< 1	1	0	0
7. Other/Unknown	Not applicable	12	42	0	0
TOTAL	**Not applicable**	**100**	**360**	**100**	**88**

* Rounded to nearest percentage.

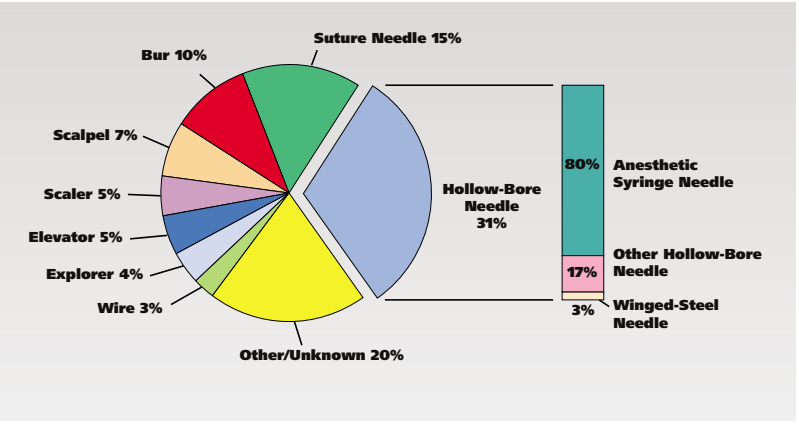

Figure 1. Frequency of devices involved in percutaneous injuries (N = 360) among dental health care personnel, December 1995 through August 2004. Source: National Surveillance System for Health Care Workers, Centers for Disease Control and Prevention.[23]

patient's mouth was recorded. Injuries occurred most commonly during oral surgical procedures (35 percent), followed by restorative (19 percent) and hygiene procedures (13 percent) (Figure 3). Fifty-five percent of injuries occurred outside the mouth, 39 percent inside, and for 6 percent, this information is unknown (Table 1).

Of the 88 injuries that involved anesthetic needles, dentists reported the largest proportion (36 percent), followed by oral surgeons (32 percent) and dental assistants (26 percent). Dental assistants more frequently sustained a needlestick after use of the device (83 percent) than did dentists (66 percent) or oral surgeons (46 percent) (Figure 4). On the basis of our categorization of how injuries occurred, a safety syringe might have prevented 53 percent of needlesticks (Figure 5). Injuries that occurred during passing and handling of instruments (46 percent) accounted for most of these potentially preventable injuries. In contrast, a safety syringe likely could not have prevented the 47 percent of injuries that occurred during manipulation of a patient or needle. Although safer work practices potentially could have prevented all needlesticks, we do not know which injuries involved an unsafe work practice.

DISCUSSION

Epidemiologic information about the specific circumstances of percutaneous injuries—such as who

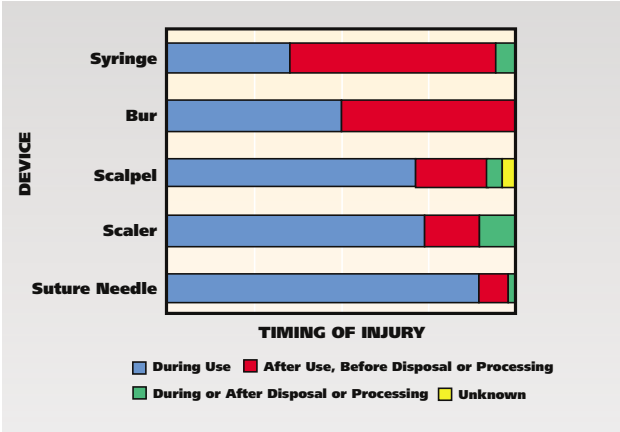

Figure 2. Timing of percutaneous injuries (N = 360) by type of device among dental health care personnel, December 1995 through August 2004. Source: National Surveillance System for Health Care Workers, Centers for Disease Control and Prevention.[23]

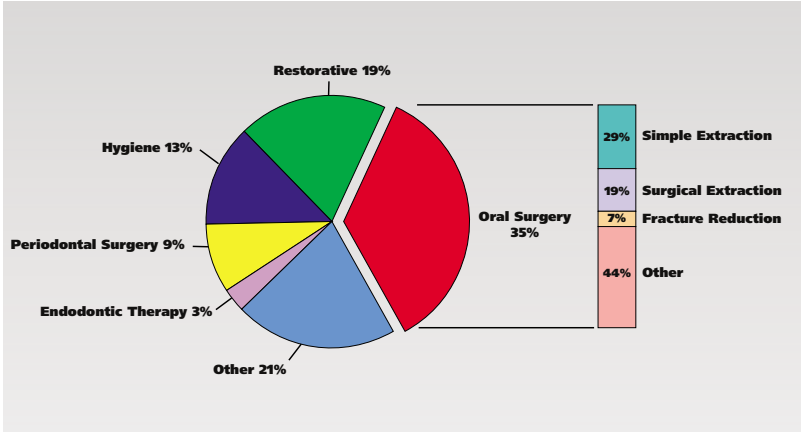

Figure 3. Frequency of dental procedures during which percutaneous injuries (N = 195) occurred among dental health care personnel, December 1995 through August 2004. Source: National Surveillance System for Health Care Workers, Centers for Disease Control and Prevention.[23]

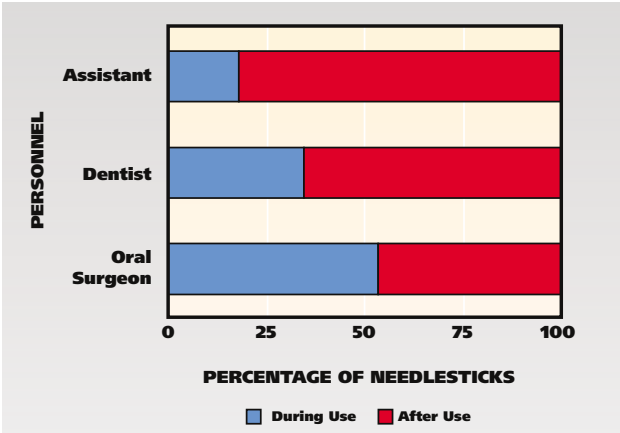

Figure 4. Timing of needlesticks (N = 88) by type of dental health care personnel, December 1995 through August 2004. Source: National Surveillance System for Health Care Workers, Centers for Disease Control and Prevention.[23]

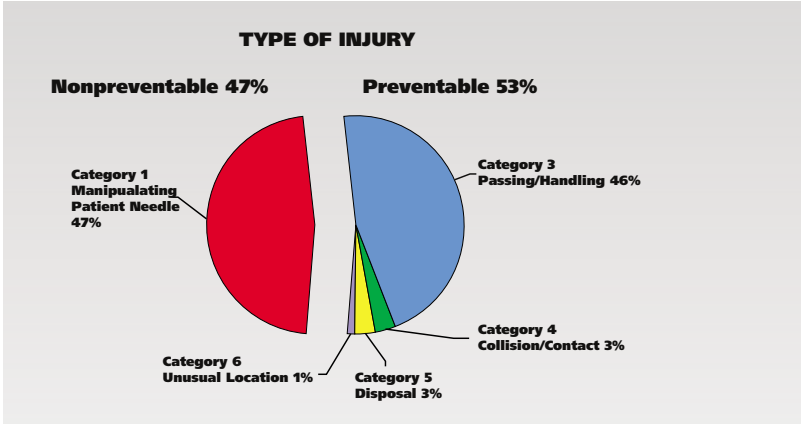

Figure 5. Estimated proportion of needlesticks (N = 88) that might have been prevented by use of a safety syringe; based on circumstances of needlesticks among dental health care personnel, December 1995 through August 2004. Source: National Surveillance System for Health Care Workers, Centers for Disease Control and Prevention.[23] (Note: No needlesticks were reported in Categories 2 or 7.)

was injured with what device, the location and timing of the injury and the type of procedure during which the injury occurred—can be useful in developing prevention strategies such as using safer instruments or improving work practices. In this study, we described the circumstances of percutaneous injuries among dental HCP in CDC's NaSH database and estimated the preventability of a subset of these injuries, needlesticks.

Injuries involving syringe needles continue to account for a large proportion of reported percutaneous injuries.[1,2,6,7] Previous studies among general dentists[1,2] and dental students and faculty[6,7] during the past two decades have found that up to one-third of reported injuries were associated with syringe needles. In one survey of oral surgeons conducted in 1992, however, wire was reported as the device most prominently associated with injuries by more than one-half (53 percent) of participating oral surgeons, followed by syringe needles and suture needles.[4] Compared with the study among oral surgeons,[4] the lower proportions of injuries with wires reported in our study may reflect varying methodologies, underreporting of occupational injuries perceived to be at lower risk of infection (that is, solid surgical or orthodontic wire versus hollow-bore syringe needles), or an increase in the use of safer work practices.

Dental assistants in our study accounted for 25 percent of needlesticks among dental HCP, with 83 percent occurring after use of a syringe. Simi-

larly, a report from a dental school in the United Kingdom analyzed the difference between needlesticks three years before and two years after introduction of safety syringes among trainees and staff members. The authors concluded that "dental trainee nurses [that is, dental assistants] were most frequently involved in needlestick injuries" during the three years before and two years after the introduction of safety syringes.[19] Although most dental assistants do not administer anesthetic, they are responsible for direct patient care and have multiple opportunities to handle or manipulate anesthetic syringes during cleanup, dismantling and disposal of used needles. Safety syringes provide guarding mechanisms for the needle that prevent needlesticks during these activities. Although the numbers in our study are small, there is no reason to believe that the circumstances of needlesticks among dental assistants in the NaSH database differ significantly from the larger pool of U.S. dental assistants, which account for 44 percent of the dental work force.[26] Thus, dental assistants might benefit appreciably from the protection of safer dental syringes, and they should participate in the screening and evaluation of new devices.

In a 2000 report, the Government Accounting Office[25] estimated that in one year, 75 percent of needlesticks occurring in hospitals were preventable: 25 percent by eliminating unnecessary use of needles, 29 percent by using needles with safety features, and 21 percent by using safer work practices. This report included data for all HCP (including dental HCP) in the NaSH database.[9] In our study, we estimated that 53 percent of needlesticks could be prevented by use of a dental safety syringe. Safety devices—such as blunt suture needles, phlebotomy devices and butterfly needles—and their ability to reduce injuries has been documented in medical and hospital settings.[27-29]

Because of low injury rates in dental settings, few studies have used statistical methods to assess the effectiveness of dental safety devices in reducing injuries. One study of medical and dental students working at an academic health center found that percutaneous injuries decreased over five years after administrative interventions, engineering controls (such as safety syringes) and educational modules were introduced.[20] (Injuries among medical and dental students were not presented separately.) Needlesticks also declined after introduction of safety syringes in a U.K. dental school, from an average of 11.8 injuries per 1 million hours worked per year to 0 injuries, compared with a control group in which injuries decreased from 26 to 20.[19] These estimates are limited by the small sample size and because improvements were made to the safety syringe during the study period.

Clinical studies evaluating the safety syringe itself have relied predominantly on subjective, qualitative measurements related to clinical acceptability (such as ease of use related to hand size, whether the device allows for multiple injections, perception of pain by the patient).[30,31] For example, one evaluation of several dental safety syringes found that the devices did not protect workers between injections or were awkward to use.[30] Although CDC has developed tools to standardize qualitative characteristics used in screening and evaluating safer dental devices,[21] these subjective measurements cannot determine if use of a safety device can reduce the number of percutaneous injuries.

The U.S. Food and Drug Administration (FDA) regulates medical and dental devices and requires that manufacturers submit a premarket notification application (known as a "510[k]") to establish that a proposed device can perform the same function as a device already being marketed. Devices with safety features require a simulated clinical study to assess the effectiveness of the safety feature and to gather user input to guide labeling. Some sharps injury prevention features are incorporated as integrated components of finished devices. Others are marketed separately as accessories that are attached to a device by the user at the point of use, such as a needle shield. The FDA guidelines apply to both integrated sharps injury prevention features and accessories marketed separately.

One challenge in developing safer alternatives for reusable anesthetic dental syringes is that the design must incorporate a method to protect dental HCP between multiple injections (that is, the needle must be able to be locked temporarily in the safety position). This unique requirement has hindered the development of dental safety syringes with passive designs. Most early devices have been either redesigned or taken off the market entirely as newer designs have emerged. Thus, published studies evaluating earlier products do not always reflect current products and should not be used as the sole source of information when one is making a decision about which devices to consider. How-

ever, such studies can be useful for identifying evaluation criteria for ongoing review of dental safety devices.

Underreporting, lack of a suitable denominator and lack of data preclude the calculation of rates of injuries among dental HCP in NaSH. Nonetheless, descriptive information on the circumstances of injuries among this population can be used to develop injury prevention priorities and strategies. The CDC is creating a new surveillance system, The National Safety Healthcare Network (NSHN), which will integrate NaSH, the Dialysis Surveillance Network and the National Nosocomial Infections Surveillance System. The NSHN will allow a broader array of dental HCP, such as those in schools and other institutions, to submit and track their occupational exposures to blood and other body fluids. This database will be available online for use by private practitioners to use in selecting and evaluating dental safety devices or developing safer work practices.

Our study has several limitations. First, it is a retrospective review of self-reported data from a small number of large, urban hospitals voluntarily enrolled in NaSH. Larger teaching hospitals and those in the northeastern United States are overrepresented in NaSH. Although NaSH data may be representative of some hospital-based and private practice dental HCP, they may not represent all types of dental HCP. In addition, underreporting and reporting bias may have affected the accuracy and completeness of reports. Our estimate of the preventability of needlesticks is based on the assumption that if dental safety syringes are used, they can prevent 100 percent of needlesticks, providing that safety features are activated and work properly, and that no failures occur. We could not calculate rates of injuries among dental HCP in NaSH because the total number of dental HCP from which the reports were collected is not available. In 2000, the NaSH questionnaire was revised to collect additional dental data such as the type of dental procedure being performed at the time of an injury and whether an injury occurred inside or outside the patient's mouth. Thus, information on these factors is available only for injuries that were reported since 2000. Finally, these data may represent only a fraction of injuries among dental HCP in these facilities, because some studies among dental students and faculty indicate that many injuries go unreported.[6,7,32] Nonetheless, most of the circumstances of injuries described in this study are similar to findings in previous reports.

CONCLUSIONS

This study found that percutaneous injuries—particularly needlesticks—among dental HCP continue to occur, and that a majority occur at a point in the workflow at which acceptable safety syringes and safer work practices could contribute to their prevention. This finding underscores the importance of including all dental HCP (including dental assistants) who may sustain a needlestick during cleanup, dismantling or disposal of dental syringes in the selection and evaluation of safer alternatives. All dental practices should include a comprehensive written program for preventing sharps injuries in their exposure control plan. This plan should describe mechanisms for implementing procedures for identifying, screening and adopting acceptable safety devices; reporting injuries promptly and providing medical follow-up for percutaneous injuries; and educating and training dental HCP in safe work practices and the proper use of dental safety devices. Consideration and documentation of this process likely will meet OSHA requirements, keep dental HCP aware of available safety devices and provide feedback for manufacturers of dental devices that may drive development of improved safety devices. ■

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