Sharps Injuries and Other Blood and Body Fluid Exposures Among Home Health Care Nurses and Aides

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Objectives. We quantified risks of sharp medical device (sharps) injuries and other blood and body fluid exposures among home health care nurses and aides, identified risk factors, assessed the use of sharps with safety features, and evaluated underreporting in workplace-based surveillance.

Methods. We conducted a questionnaire survey and workplace-based surveillance, collaborating with 9 home health care agencies and 2 labor unions from 2006 to 2007.

Results. Approximately 35% of nurses and 6.4% of aides had experienced at least 1 sharps injury during their home health care career; corresponding figures for other blood and body fluid exposures were 15.1% and 6.7%, respectively. Annual sharps injuries incidence rates were 5.1 per 100 full-time equivalent (FTE) nurses and 1.0 per 100 FTE aides. Medical procedures contributing to sharps injuries were injecting medications, administering fingersticks and heelsticks, and drawing blood. Other contributing factors were sharps disposal, contact with waste, and patient handling. Sharps with safety features frequently were not used. Underreporting of sharps injuries to the workplace-based surveillance system was estimated to be about 50%.

Conclusions. Sharps injuries and other blood and body fluid exposures are serious hazards for home health care nurses and aides. Improvements in hazard intervention are needed. (*Am J Public Health.* 2009;99:S710–S717. doi:10.2105/AJPH.2008.150169)

Home health care is one of the fastest growing industries in the United States.[1] Approximately 7.6 million people receive care in their homes from nurses, aides, and other professionals employed by more than 17 000 provider organizations.[2] Home health care will continue to grow as a result of the aging population, technological advances, health care cost containment, infection control, and the common desire to be cared for at home.[1,3,4]

Many medical procedures performed in hospitals are increasingly also performed at home,[1] and a significant number of these procedures require the use of sharp medical devices (sharps) such as hypodermic needles, lancets, and intravenous systems. In addition to the sharps used by home health care clinicians, approximately 8 to 9 million Americans self-inject medications at home, and many more use lancets to perform routine glucose tests.[5] It is estimated that every year more than 2 billion needles and syringes are used by self-injectors outside of traditional health care settings, mostly by people with diabetes to administer insulin.[6] Most of these needles are disposed of in household trash.[5,6]

Health care workers are at risk for infection from bloodborne pathogens as a result of percutaneous injuries from sharps and also from mucous membrane and skin exposures to contaminated blood or body fluids. Occupational exposure to bloodborne pathogens, particularly hepatitis B, HCV, or HIV, can result in debilitating or fatal disease, and even when postexposure prophylaxis is timely and effective, treatments have serious health and economic consequences.[7,8]

The public health magnitude of sharps injuries and other blood and body fluid exposures in health care remains poorly defined because surveillance has been limited. Although workplaces in which there is the potential for bloodborne pathogen exposures are required to have reporting systems under the Occupational Safety and Health Administration (OSHA) bloodborne pathogen standard,[9] workplaces may not implement them effectively or workers may not report to them.

Research on the risks and reporting of sharps injuries and other blood and body fluid exposures has largely focused on hospitals; only a few recent studies have focused on home health care.[5,8,10–19] Home health care is understudied in part because work settings are geographically dispersed, the home is seldom recognized as a work environment,[17] and the workforce is made up mainly of women.[20] In addition, home health care aides earn low wages and are often immigrants or members of racial/ethnic minority groups.[21–29] We evaluated sharps injuries and other blood and body fluid exposures in a population of home health care nurses and aides by quantifying risks, identifying risk factors, assessing the availability and use of sharps with safety features, and evaluating underreporting in workplace-based surveillance.

METHODS

The study was designed in multiple phases, including focus groups involving direct care workers and in-depth interviews with home health care agency managers and union representatives, a questionnaire survey, and the establishment of home health care agency-based bloodborne pathogen surveillance systems. The focus groups and interviews were used to investigate the nature of home health care work and its associated occupational health and safety hazards, especially those related to sharps injuries and other blood and body fluid exposures. This qualitative phase also informed the development of a comprehensive questionnaire survey. Details of the qualitative phase have been reported elsewhere.[17,30] In this article, we describe the results of the survey and the home health care agency-based surveillance system.

Survey Population Recruitment and Administration

This study was conducted in collaboration with 9 home health care agencies and 2 labor unions representing home health care nurses and aides in Massachusetts. All unionized home health care workers in Massachusetts were represented by the partner unions. The agencies were recruited via the main home health care trade association and professional organizations. The agencies varied in terms of number of employees (one of the largest agencies in Massachusetts was included) and geographic location (including urban and suburban areas and small towns). The primary criterion for individual survey participation was performance of direct patient care, including medical care or assistance with tasks such as patient ambulation and transfer, shaving, denture care, foot care, bathing, and toileting.

Details regarding survey population recruitment and administration have been provided elsewhere.[30] Briefly, all employees with direct patient care job duties at home health care agencies or represented by home health care unions were sent a questionnaire either through their agencies or via the US mail. Union-recruited members returned the questionnaire by mail; participants at agencies returned the questionnaire in person during an on-site promotional event organized by the research team, to a secure collection box in the agency office, or through the US mail. Several home health care agencies had multiple office locations, yielding a total of 26 sites for the agency survey administration. A total of 1772 questionnaires were distributed between October 2006 and May 2007.

Questionnaire Development

Based on discussions with the agencies and unions, it was determined that the target population had sufficient language proficiency to complete the questionnaire in English. To ensure comprehension and completion in 30 minutes or less, the 18-page, self-administered questionnaire was pilot-tested among home health care nurses and aides from agencies similar to but not participating in the study.[30] The focus groups and interviews provided information for the development of survey questions, especially with respect to the professional language and culture relevant to the study objectives and outcome measures. When possible, questions were worded to be comparable to the wording used in previous surveys focusing on bloodborne pathogens.[31,32]

Outcome definitions. Workers who had been stuck or cut by a previously used sharp object, such as a needle or lancet, in home healthcare work were defined as having experienced a sharps injury. The questionnaire asked separately about other blood and body fluid exposures, defined as blood or body fluids coming in direct contact with one's eyes, mouth, or broken skin during home health care work. The OSHA bloodborne pathogen standard focuses primarily on blood or other body fluids that contain blood. However, it recognizes that health care workers may not know whether body fluids contain blood and also that nonbloody body fluids are potentially infectious. In our study, the other blood and body fluid exposure category included exposure to all body fluids, whether or not they were visibly bloody.

Participants were asked about sharps injuries and other blood and body fluid exposures occurring over 2 different time intervals. First, they were asked whether they had ever been stuck or cut (or had blood or body fluids come in direct contact with their eyes, mouth, or broken skin) during home health care work. They then were asked how many times in the preceding 12 months they had experienced a sharps injury (or other blood and body fluid exposures in a separate question). Those who reported ever having experienced at least 1 sharps injury or other blood and body fluid exposure were asked to consider the most recent event and to respond to open-ended questions that elicited detailed narratives on the timing of and circumstances leading up to the event, as well as associated risk factors. The most recent event was the unit of analysis chosen for the detailed responses to improve recall by focusing on a specific event rather than generalizations about past experiences.

Reporting, training, and use and availability of sharps with safety features. A set of questions asked participants whether their most recent sharps injury or other blood and body fluid exposure was reported to their employer, the timing of reporting after the event, or, if relevant, their reasons for not reporting. Also in relation to the most recent sharps injury, questions were asked about the type of device involved and the use and availability of sharps with safety features.

In addition, all nurses and aides were asked about reporting and training in general, and all nurses were asked about the use and availability of sharps with safety features in general. General reporting was investigated with questions about whether respondents were aware of their employer's reporting system and why a home health care worker might not report a sharps injury or other blood and body fluid exposure. Training on the employer's reporting system and on the use and disposal of sharps also was investigated.

Risk factors. The risk factor evaluation had 2 objectives: (1) to quantify the prevalence of factors contributing to sharps injuries and other blood and body fluid exposures reported in the focus group phase of the study and (2) to identify whether risk factors for injuries and exposures found in previous studies, conducted primarily in hospitals, were relevant to home health care. The second objective was intended to be exploratory to inform the development of future, more in-depth risk factor analyses.

The questionnaire included sections on sociodemographic characteristics, job experience, and other factors potentially related to the risk of a sharps injury or other blood and body fluid exposure, including patient care procedures such as injecting medication and placing sharps into containers, work environment factors such as lack of work space and awkward postures, patient characteristics such as aggressive and uncooperative behavior, and work organization factors such as time pressures and safety climate. These risk factor questions involved closed-end responses.

Survey Data Entry and Analysis

Questionnaire responses were entered into a database, and quality control included double entry of a subset of questionnaires via the Advanced Data Entry and Protocol Tracking system (New England Research Institute, Watertown, MA).[33] Questionnaire data were converted to SAS[34] format and analyzed via SAS and STATA.[35] NVIVO qualitative research software[36] and Microsoft Office Access[37] were used in coding open-ended narratives. Themes identified in the narratives were matched to

similar themes in the closed-ended survey responses to link the 2 types of data.

An intercept-only Poisson regression model with robust variance was used to estimate annual incidence rates.[35] We standardized rates per 100 full-time-equivalent (FTE) employees by expressing weekly hours worked from the questionnaire responses as a fraction of 40 hours, assuming a 50-week work year. We conducted the χ^2 and t test to evaluate bivariate relationships between sharps injuries or other blood and body fluid exposures and each of the risk factors for evidence of associations with annual incidence rates. Risk factors for which there was evidence of bivariate associations were then entered into multivariate models to assess effect modification and confounding.

Home Health Care Agency–Based Surveillance Systems

During the time the survey was conducted, a pilot surveillance system for reporting of sharps injuries and other blood and body fluid exposures was established in 3 of the home health care agencies. Two of these agencies also participated in the survey, which allowed an evaluation of reporting by comparing the number of sharps injuries and other blood and body fluid exposures reported in the survey with the number of events reported to the agency-based surveillance system. The Massachusetts Department of Public Health Bloodborne Pathogen Exposure Recording form developed for hospitals was adapted to home health care and distributed to agencies in 2006. Using this form, the agencies agreed to collect and submit to the Department of Public Health all bloodborne pathogen exposure information already required under the OSHA standard along with additional information, such as data on the type of sharp device involved in an event.

RESULTS

A total of 1225 completed surveys were returned, yielding an overall response rate of 69%. For the purposes of our data analyses, we created 3 occupational groups based on the type of care provided: nurses (registered nurses and licensed practical nurses) made up 64% of the respondents; aides (certified home health aides, certified nurses aides, and personal care attendants) accounted for 23%; and those from other categories (homemakers, physical therapists, physical therapy assistants, occupational therapists, occupational therapy assistants, and social workers) accounted for 13%.

The study population was predominantly female (96%) and White (91%). The average age of nurses and aides was similar (48 and 47 years, respectively), and both groups had worked in home health care for an average of 11 years. Twenty-nine percent of nurses and 26% of aides were represented by unions. Most participants worked full time (52%) or part time (38%); 10% were per-diem employees (an occupational term used in the industry) hired on a contingency basis and covering a wide range of hours. Because of the heterogeneity of the "other" occupational group, the results described in the sections that follow focus on nurses and aides.

Risk of Sharps Injuries and Other Blood and Body Fluid Exposures

Three measures were used in quantifying risk of sharps injuries and other blood and body fluid exposures among nurses and aides: risk of ever having had at least 1 sharps injury or other blood and body fluid exposure during one's entire home health care career; annual risk, based on having experienced an injury or exposure in the preceding 12 months; and annual incidence rate per 100 FTE employees (Table 1). As expected, relative to aides, nurses were at comparatively higher risk over their home health care career of having experienced at least 1 sharps injury, and the annual sharps injury incidence rate was also higher in that group.

Although based on small numbers, the risk of sharps injuries was substantial among aides as well, despite the fact that their scope of responsibilities seldom involved direct use of sharps. More than 6% of aides reported a sharps injury at some time in their home health care career, and although only 2 sharps injuries were reported during the preceding year, this resulted in an annual sharps injury incidence rate of 1.0 per 100 FTE aides (95% confidence interval [CI]=0.2, 4.0). Over their home health care careers, nurses had about twice the risk of other blood and body fluid exposures of aides (15.1% vs 6.7%); however, the annual exposure incidence rates were similar in the 2 groups (6.3 per 100 FTE nurses and 6.5 per 100 FTE aides).

Risk factors. The medical procedures most frequently performed by nurses when they experienced sharps injuries were injections (31%), fingersticks or heelsticks (23%), and blood draws (22%; Table 2). Examination of the types of devices used during these procedures (data not shown) showed that the majority were hollow bore needles (76%) and cutting blades such as lancets (21%). Sharps injuries among aides were most often caused by contact when disposing of used sharps (28%). Notably, the next most risky procedure among both nurses and aides was placing

TABLE 1—Risk of Sharps Injuries and Other Blood and Body Fluid Exposures Among Home Health Care Nurses and Aides: Massachusetts, 2006–2007

	Nurses (n = 787)		Aides (n = 282)	
	No.	% (95% CI) or Rate (95% CI)	No.	% (95% CI) or Rate (95% CI)
Career risk, %				
At least 1 sharps injury	275	34.9 (31.6, 38.4)	18	6.4 (3.8, 9.9)
At least 1 blood/body fluid exposure	119	15.1 (12.7, 17.8)	19	6.7 (4.1, 10.3)
Annual risk, %				
Sharps injury	34	4.3 (3.0, 6.0)	2	0.7 (0.0, 2.5)
Other blood/body fluid exposure	42	5.3 (3.9, 7.1)	13	4.6 (2.5, 7.8)
Annual incidence rate per 100 FTE				
Sharps injury	34	5.1 (3.7, 7.1)	2	1.0 (0.2, 4.0)
Other blood/body fluid exposure	42	6.3 (4.7, 8.5)	13	6.5 (3.8, 11.0)

Note. CI = confidence interval; FTE = full-time equivalent.

TABLE 2—Risk Factors Contributing to Most Recent Sharps Injury or Other Blood and Body Fluid Exposure Among Home Health Care Nurses and Aides: Massachusetts, 2006–2007

	Sharps Injury		Other Blood/Body Fluid Exposure	
Risk Factor Category[a]	Nurses (n = 275), %	Aides (n = 18), %	Nurses (n = 119), %	Aides (n = 19), %
Patient care procedures				
Injecting medication	31	0	3	5
Placing sharps into a container	27	22	1	0
Administering fingerstick/heelstick	23	6	3	0
Drawing blood	22	0	6	0
Using an intravenous line	8	0	3	0
Debriding	2	0	29	0
Making contact with waste	2	28	29	21
Emptying sharps container	<1	6	0	5
Changing linen	. . .	. . .	2	11
Work environment factors				
Lack of work space	22	11	24	11
Clutter or unclean conditions	22	28	13	11
Distractions from others	18	17	8	0
Equipment difficult to reach/use	14	6	19	5
Poor lighting	14	17	14	11
Awkward postures	11	0	21	21
Patient factors				
Aggressive patient	11	6	8	21
Uncooperative patient	9	0	21	32
Difficulty communicating with patient	8	0	8	16
Patient needed physical support	3	0	16	53
Patient lifting	1	6	3	21
Work organization factors				
Time pressures	24	6	14	11
Too many patient assignments	11	11	11	16
Long work days	11	6	8	5

Note. Percentages do not sum to 100% because multiple responses were provided.
[a]Factors occurring with at least 10% frequency in 1 or more subsets of the population.

sharps into containers (27% and 22%, respectively), and 6% of aides associated their injuries with emptying sharps containers.

When the timing of sharps injuries was evaluated, it was found that most such injuries occurred after the sharp had already been used for its intended medical procedure. Of the 275 most recent sharps injuries among nurses, 58% occurred after use and before disposal, whereas 25% occurred during or after disposal. Of the 18 most recent sharps injuries among aides, 44% occurred after use and before disposal and 44% occurred during or after disposal. The medical procedure most often contributing to other blood and body fluid exposures among nurses was debriding (29%). Contact with waste was the top risk factor for exposures among aides and second among nurses.

Both nurses and aides identified lack of work space and clutter or unclean conditions as work environment factors contributing to sharps injuries and other blood and body fluid exposures, and awkward postures were a primary risk factor for exposures in both groups. Patient handling tasks contributed to nearly three fourths of exposures among aides (53% reported that the event was related to a patient needing physical support, and 21% identified patient lifting as contributing to the exposure). Aggressive or uncooperative patients were a contributing factor in more than half of the exposures among aides and nearly a third among nurses. With respect to work organizational risk factors, almost 25% of nurses reported that time pressures contributed to their sharps injuries.

Job characteristics and annual incidence rates. There was a pronounced effect of employment status on rates of both sharps injuries and other blood and body fluid exposures: the highest rate was among per-diem nurses (13.4 per 100 FTE), followed by part-time (9.1 per 100 FTE) and full-time (2.9 per 100 FTE) nurses (Table 3). Data were not sufficient to investigate injury and exposure rates by employment status among aides. The rate of sharps injuries among nurses with shorter home health care tenures—less than 5 years—was approximately 3 times the rate among those with more than 5 years of experience. There was no effect of tenure on the rate of other blood and body fluid exposures among nurses.

In response to the question "How satisfied are you with your current home health care job?" 67% of all nurses (n=787) and 73% of all aides (n=282) reported being satisfied; 27% of nurses and 19% of aides were somewhat satisfied, and only 2% of both groups were not satisfied. When annual sharps injury and other blood and body fluid exposure rates among nurses were evaluated according to job satisfaction, results showed that those who reported being not at all satisfied or somewhat satisfied had almost 3 times the annual sharps injury incidence rate and nearly twice the annual rate of other blood and body fluid exposures of those who were satisfied (Table 3).

With respect to workplace safety climate, more aides than nurses agreed with the statement "I believe patient care comes before employee safety in my workplace" (21% vs 15%). When annual incidence rates of sharps injuries and other blood and body fluid exposures were evaluated according to this statement, it was found that the rates of both injuries and exposures were more than twice as high among those who agreed with the statement than among those who disagreed (Table 3).

TABLE 3—Annual Incidence Rates per 100 Full-Time-Equivalent Nurses of Sharps Injuries and Other Blood and Body Fluid Exposures, by Job Characteristics: Massachusetts, 2006–2007

	Sharps Injuries		Other Blood/Body Fluid Exposures	
Job Characteristic Category	No. of Events (n = 34)	Rate (95% CI)	No. of Events (n = 42)	Rate (95% CI)
Employment status				
Full time	13	2.9 (1.7, 4.9)	21	4.7 (3.1, 7.1)
Part time	16	9.1 (5.6, 14.5)	16	9.1 (5.6, 14.6)
Per diem	5	13.4 (5.6, 31.7)	5	13.4 (5.7, 31.5)
Home health care tenure, y				
<5	15	10.2 (6.2, 16.6)	10	6.8 (3.7, 12.5)
≥5	13	3.2 (2.0, 5.3)	31	6.3 (4.4, 8.9)
Job satisfaction				
Not at all/somewhat satisfied	18	9.5 (6.0, 15.1)	18	9.5 (6.0, 15.1)
Satisfied	15	3.3 (2.0, 5.5)	23	5.1 (3.4, 7.7)
Patient care comes before employee safety				
Disagree	23	4.2 (3.8, 6.2)	30	5.4 (3.8, 7.8)
Agree	11	11.7 (6.1, 20.0)	12	12.1 (6.9, 21.3)

Note. CI = confidence interval.

These and other risk factors have been investigated in more detail elsewhere.[38]

Sharps with and without safety features. Nurses (n=787) were asked about their use of sharps with and without safety features. Nearly all (89%) reported that their employers supplied at least some sharps with safety features, and nearly all nurses were currently using such devices. However, many nurses (39%) reported that use of sharps without safety features was still common, and 30% reported sometimes having to use a sharp with a safety feature for which they had not received training. The main reasons for not using sharps with safety features even when they were provided were that these devices were more difficult to use than a standard device (reported by 26% of nurses), the safety features did not work well (24%), and more time was needed to perform the procedure than with a standard device (7%). The principal procedures for which nurses were using sharps without safety features were injecting medication, drawing blood, and administering fingersticks or heelsticks.

To further evaluate use of sharps with safety features, we analyzed the sharps injuries reported by nurses between 2001 and 2007, the period after passage of the Needlestick Safety and Prevention Act (Public Law 106-430, 114 STAT. 1901, November 6, 2000); this legislation revised the OSHA bloodborne pathogen standard to explicitly require the use of sharps with safety features. In 65% of the 124 sharps injuries reported among nurses during that period, the sharp involved did not have a safety feature (Figure 1). Among the 31% of injuries in which the sharp did have a safety feature, the nurse reported that the safety feature failed 28% of the time. Two thirds of the nurses who reported an injury from a sharp without a safety feature stated that a safety feature might have prevented the injury.

Reporting of Sharps Injuries

The aforementioned pilot surveillance system established in the 2 home health care agencies received reports of 7 sharps injuries (all among nurses) during the survey period. The survey covering the same agencies for the same period recorded 12 sharps injuries (again all among nurses). The latter number was probably an underestimate because the survey response rate in the participating agencies was only 73%. Correcting for this underestimation, the actual number of sharps injuries among workers in these 2 agencies would be expected to be 16, slightly more than twice the number reported to the Massachusetts Department of Public Health surveillance system.

In their survey responses regarding their main reasons for not reporting sharps injuries and other blood and body fluid exposures to their employer, nurses and aides most frequently cited lack of time (61%) and fear of being blamed or getting in trouble (48%). The next most frequent reasons were perception that the risk of infection is low (45%), concerns about confidentiality (28%), and not knowing how to report injuries or exposures (23%).

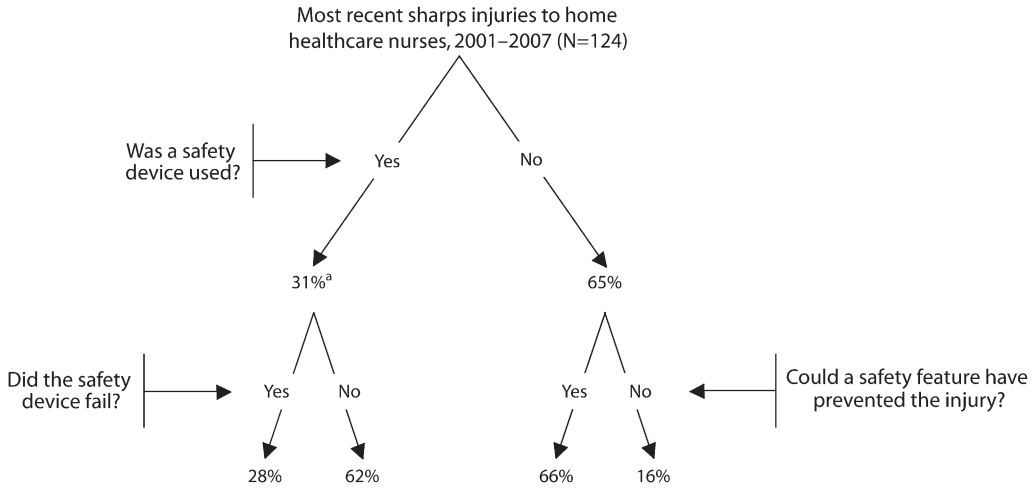
DISCUSSION

Our results provide documentation that the home is not necessarily a safe work environment and that home health care nurses and aides experience serious hazards, including sharps injuries and other blood and body fluid exposures. Often the home is not recognized as a legitimate workplace with associated hazards, and this lack of recognition can lead to difficulty in implementing effective public health interventions.

Comparison With Previous Studies

Although caution must be exercised in making comparisons across studies owing to differences in data collection and analytic methods, our sharps injury incidence rates among home health care nurses are consistent with the findings of other studies in hospital and nonhospital settings. A pilot study conducted by Gershon et al. showed that 9 (13%) of 72 home health care registered nurses had experienced sharps injuries in the preceding 12 months and that about half of these injuries were reported to their employers[39]; in a separate study of nonhospital registered nurses mainly employed in state institutions, these same authors found that 8.7% of the participants had experienced a needlestick in the preceding year, and about half did not formally report their injury.[13]

Trinkoff et al. reported that 8.5% of 164 registered nurses in home health care, hospice, or assisted living systems had suffered a needlestick injury in the year prior to a mail survey.[40] Dement et al. reported 6.9 percutaneous injuries per 100 FTE inpatient nurses and 3.0 percutaneous injuries per 100 FTE



[a]Percentages do not add to 100% due to missing and "don't know" responses.

FIGURE 1—Use and effectiveness of sharps with safety features associated with sharps injuries to home health care nurses: Massachusetts, 2001–2007.

ambulatory care and administrative nurses in a large US medical center.[41]

Public Health Impact

Although the annual sharps injury rate in our survey was relatively low among home health care aides as compared with nurses, the public health impact on aides is high because of the potentially severe health consequences in a population with typically limited economic resources. One of every 2 direct home health care aides lives in a low-income family, and many live in poverty.[27] In addition, the total number of home health care aides in the United States is considerably larger than the number of home health care nurses, and thus the absolute number of sharps injuries among aides is substantial. According to our sharps injury risk estimates, the overall numbers of sharps injuries in the United States each year could be about 10 000 among aides and 8000 among nurses (assuming that our population had a distribution of hours worked similar to the national average, the annual risks shown in Table 1 can be applied to the 1 429 930 aides[22,23] and 185 240 nurses[42,43] employed in home care in the United States in 2007).

It is likely that our risk estimates are underestimates of national averages because our partner home health care agencies were motivated to participate based on their concern for employee health, and thus these agencies may provide better than average health and safety conditions. We made no attempt to characterize workplaces where nurses or aides were hired directly by the patient; in such situations, injury rates could be higher because of the lack of formal occupational safety and health training legally required of home health care agencies.

In addition, our risk estimates for other blood and body fluid exposures were likely to be low because many nurses and aides reported that such exposures occur "all the time" and "they are part of our job," perhaps making accurate recall difficult. Also, nurses and aides did not always know whether a body fluid contained blood. These conditions contrast with sharps injuries, which are relatively rare and marked by a sudden physical impact. Moreover, knowing that sharps are a risk for hepatitis and HIV charges such events with fear, making them more memorable. For these reasons, we chose to analyze sharps injuries and other blood and body fluid exposures separately.

Interventions

We identified several risk factors for which workplace interventions can be readily developed. Many sharps injuries occurred after the sharp had already served its intended purpose and was being disposed or had been set aside by a patient for later reuse. In the case of both nurses and aides, activities related to sharps disposal containers were potentially hazardous. Although aides do not routinely perform direct care activities with sharps, our data indicate that aides dispose of sharps. Intervention efforts should focus on prevention through design techniques, including medical devices or practices that eliminate sharps entirely, devices in which the sharp is obliterated immediately after its function has been served, and redesign of sharps disposal containers and how those containers are handled.[44]

Although awkward postures and patient handling activities are well-documented musculoskeletal strain hazards, our data show that they may also contribute to sharps injuries and especially other blood and body fluid exposures among aides (Table 2). Meyer and Muntaner found that, in home health care, equipment and assistance for lifting and moving or for responding to a patient's fall may be minimal or nonexistent.[45] We found that uncooperative or aggressive patients also contributed to blood and body fluid exposures, especially among aides (Table 2). Our findings and those of Meyer and Muntaner point to the need for safe patient handling interventions that can be implemented effectively in the home.

Both nurses and aides frequently associated a sharps injury or other blood and body fluid exposure with lack of work space and cluttered or unclean conditions, and aides identified

cleaning tasks as important contributors to sharps injuries. We learned through the survey narratives and our earlier focus groups that at-home patients with chronic diseases such as diabetes often reuse their sharps. In 2004, diabetes mellitus was the fourth largest diagnosis on Medicare's list of the conditions for which home health care is most frequently used.[2] Our agency and union partners emphasized the need for a public health campaign aimed at patients to help them prepare their homes for safe home health care and to understand that the safety of the home health care worker and the patient are linked.

Contributing Factors

Our findings regarding selected job characteristics as risk factors for sharps injuries among nurses (Table 3) are suggestive and require further investigation. Sharps injury rates were higher among per-diem nurses (13.4 per 100 FTE) than among part-time nurses (9.1 per 100 FTE) and, in particular, full-time nurses (2.9 per 100 FTE). This finding is consistent with the results of a recent study conducted by Cummings and Kreiss showing higher occupational safety and health risks among contingent workers than among those in traditional employment settings.[46] Root causes for this pattern are not certain, but possible explanations were suggested in our focus groups: full-time employees are likely to receive better training than part-time and especially per-diem employees, and they are more likely to revisit the same clients and thus become familiar with their home environments.

We also found that home health care nurses reporting lower levels of job satisfaction were more than twice as likely as those with higher job satisfaction to have experienced a sharps injury in the preceding 12 months (Table 3). In addition, home health care nurses who agreed that "patient care comes before employee safety in my workplace" were more than twice as likely as those who disagreed with this statement to have a sharps injury (Table 3).

Caution is needed because the direction of a causal relationship cannot be established with cross-sectional data. Our findings are consistent with the results of the cross-sectional studies of Gershon et al., who found a 2-fold higher risk of sharps injuries among nonhospital-based nurses reporting low job satisfaction than among those who were satisfied,[13] and Clarke et al., who showed that work environment and organizational climate factors are positively associated with sharps injuries among nurses working in hospitals.[47,48]

Sharps With Safety Features

Use of sharps with safety features is an important primary prevention measure against sharps injuries, second only to needleless systems, and an integral requirement of the revised OSHA bloodborne pathogen standard in November 2000. Despite regulations, we found that almost 40% of nurses reported using sharps without safety features. In nearly two thirds of participants' most recent sharps injuries (i.e., those occurring between 2001 and 2007), the sharp had no safety feature; in one third of these cases, the injury occurred even when a sharp with a safety feature was used. The latter finding is consistent with the results of Trinkoff et al., who found that one third of needlesticks among registered nurses involved a sharp with a safety feature.[40] A systematic analysis of how sharps with and without safety features enter the home is needed to close the gap between regulatory intent and practice. In addition, the efficacy of engineered safety features for sharps should be evaluated and this information disseminated to medical device design teams.

Occupational Safety and Health Training

A primary reason offered by home health care nurses and aides for not reporting their sharps injuries or other blood and body fluid exposures is that they perceived the patient to be at low risk for a bloodborne pathogen infection. This finding highlights the need in home health care for more effective training in the area of bloodborne pathogens. Haiduven and Ferrol noted that, in the United States, more HIV-positive patients are being cared for in the home than in other health care settings.[15] Because of improved medication, HIV/AIDS patients are living longer, and an elderly patient can no longer be considered a low HIV infection risk.

Training for home health care nurses and aides should emphasize taking protective action as if all patients presented a risk with respect to bloodborne pathogens. Underreporting of bloodborne pathogen exposures in any health care setting hinders not only essential postexposure care of injured or exposed clinicians but also implementation of preventive measures (e.g., regulatory or workplace policies, engineering controls, work practice measures).[49]

Conclusions

Our findings highlight the need for work-related interventions designed to prevent sharps injuries and other blood and body fluid exposures among home health care nurses and aides. As these interventions are developed, we believe it is important to consider that, despite occupational safety and health hazards, the majority of nurses and aides are satisfied with their work. As we develop public health interventions aimed at improving safety, we need to preserve and enhance those aspects of the job that make dignified, meaningful care possible. ■

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Contributors

M.M. Quinn and L. Davis originated the study. M.M. Quinn directed all aspects and drafted the article. P.K. Markkanen, C.J. Galligan, D. Kriebel, S.M. Chalupka, H. Kim, R.J. Gore, S.R. Sama, A.K. Laramie, and L. Davis helped to conceptualize ideas, collect and interpret data, and review drafts of the article. A.K. Laramie and L. Davis supervised the surveillance. P.K. Markkanen and C.J. Galligan supervised the survey data collection. M.M. Quinn, P.K. Markkanen, D. Kriebel, H. Kim, R.J. Gore, and S.R. Sama conducted the data analyses.

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Human Participant Protection

The questionnaire and study protocols were approved by the institutional review board of the University of Massachusetts Lowell.

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