Critical Incidents of Nonadherence with Standard Precautions Guidelines Among Community Hospital-based Health Care Workers

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OBJECTIVE: To identify, categorize, and assess critical incidents of nonadherence to standard precautions.

DESIGN: Qualitative and quantitative analysis of a written, mail-out survey.

SETTING: Community hospitals.

PARTICIPANTS: Statewide stratified random sample of community hospital-based health care workers at risk for blood exposure.

MAIN VARIABLE: Responses to the question: "Think of an incident during the past year when you didn't adhere to universal precautions. Please describe the situation and why you didn't adhere."

RESULTS: Reasons given for not using precautions included: belief that stopping to use standard precautions would have put the patient at risk (22%); using precautions would have interfered with patient care (20%); precautions were not warranted in a specific situation (14%); did not anticipate the potential for exposure (14%); and high job demands that had caused respondent to be in a hurry (11%). Less often, equipment was not available (7%), respondent forgot (6%), respondent thought that the patient did not pose a risk (4%), or the available equipment was not effective (3%). In terms of overall exposure rates, 34% of those who described an incident had experienced a sharps injury during the previous 3 months and 42% had experienced a mucocutaneous exposure. In terms of overall nonadherence, 44% wore gloves less than 100% of the time, while 61% washed their hands less than 100% of the time.

Needlestick injuries were lowest among those who had forgotten to use precautions, while mucocutaneous exposures were highest among those who had not anticipated potential exposure while performing the task. Failure to wear gloves routinely was highest among those who said that following precautions interfered with their ability to provide care and among those who believed a particular patient to be low risk; failure to wash hands routinely was also highest among the latter group and lowest among those who said necessary equipment was not available.

CONCLUSIONS: Using specific information about local incidents of nonadherence to standard precautions may enhance training, especially if the program identifies incidents of unanticipated exposure and helps workers plan for them in the future. Closer examination of job demands and responsibilities that interfere with standard precautions may increase the likelihood of adherence.

KEY WORDS: blood-borne pathogens; needlestick injuries; standard precautions; inservice training.

J GEN INTERN MED 2004;19:726-731.

Although universal precautions guidelines have been in place since 1987,¹⁻³ suboptimal adherence has been documented extensively^{4,5} despite evidence that failure to use barrier precautions increases the risk of mucocutaneous blood and body fluid exposure and adherence decreases risk.^{6,7} Correlational studies have shown that nonadherence among physicians and nurses is associated with inadequate knowledge, forgetfulness, workload, workplace safety climate, and the perception that colleagues also failed to adhere, while adherence is associated with seeing precautions as a way to avoid injury or exposure and with concern about protecting colleagues.⁸⁻¹³ Even the most effective intervention studies, however, have concluded that more work needs to be done to reduce exposures to blood-borne pathogens.⁵

This paper describes the identification, categorization, and assessment of key recent incidents involving community hospital-based health care workers who did not follow standard precautions. As part of a larger study undertaken to determine the epidemiology and risk factors for needlestick injuries and mucocutaneous exposures, we asked respondents to describe a specific incident of nonadherence and to explain why it occurred.^{14,15} Because respondents used their own words and offered their own interpretations, we hoped to identify variables that had not been identified in more structured questionnaires.¹⁶

METHODS

The sampling frame, which was stratified to specifically identify those from community hospitals of various bed sizes, included statewide provider and professional organization databases of physicians, nurses, and laboratory workers. The questionnaire, which was limited to 3 pages, identified the most important occupational risk factors, assessed attitudes toward and adoption of precautions, and estimated occupational exposures. The study procedures, cover letters, and instrument were approved by the Institutional Review

Received from the Departments of Community and Behavioral Health (KJF, BND), Pathology (SEB), Epidemiology (BND), University of Iowa College of Public Health; Department of Internal Medicine (BND), University of Iowa Carver College of Medicine, Iowa City, Iowa; Indianapolis Veterans Affairs Medical Center, Regenstrief Institute, and Department of Medicine, Indiana University-Purdue University, Indianapolis, Ind; and the Department of Family and Community Medicine (HW), University of New Mexico, Albuquerque, NM.

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Board of the University of Iowa. A cover letter acknowledged collaboration and funding by the Centers for Disease Control and Prevention as well as the National Institute of Occupational Safety and Health. A letter of support from the director of the Iowa Department of Public Health and the state epidemiologist was included in the mailing.

Respondents were asked to estimate their recent (past 3 months) blood exposures to the skin, mouth, eyes, and/or nose (referred to here as mucocutaneous exposures) and sharps injuries. In addition, subjects were asked how many of these exposures they reported or formally documented. A 3-month period was used in order to minimize recall bias, yet obtain adequate numbers of injuries.¹⁷⁻¹⁹ Adherence with key standard precautions measures was estimated along a 10-cm visual analog scale, and extrapolated to a 0% to 100% scale. Subjects were asked what percent of the time they typically: 1) "wear gloves when performing an invasive procedure (e.g., drawing blood)," 2) "wash your hands after patient contact before caring for the next patient," and 3) "recap needles after use before disposing of them in a sharps container." The phrasing of these questions denoted specific patient care settings in which adherence should be routine, that is, occur 100% of the time.

Respondents were asked an open-ended written question: "Think of an incident during the past year when you didn't adhere to universal precautions. Please describe the situation and why you didn't adhere." Responses were typed verbatim into a database (Microsoft Access, Microsoft Corporation, Redmond, Wash) and exported to Atlas-ti,²⁰ a qualitative data analysis software package (Scientific Software Development, Berlin, Germany). The first 500 incident codes and associated text were discussed by project investigators, and the coding plan was revised before a second individual was trained to complete the coding.²¹⁻²³ Then a nurse epidemiologist independently coded 135 randomly selected incidents. She confirmed the original code 74% of the time. For the two categories in which there was greatest disagreement, the nurse trained in infection control coded more of the incidents as "disagreed with the need for precautions" ($N = 32$) as compared to the lay coder, who coded them as "using precautions would have put the patient at risk" ($N = 23$). After review of discrepant codes, investigators elected to retain the lay coder's responses as they reflected respondents' own interpretation of the incident as an emergency, even though one independent observer may not have shared that interpretation.

To examine differences in exposure rates across categories, we calculated a confidence interval for the proportions for all categories, and then determined whether the proportion of a specific category fell within that confidence interval. A similar approach was used to assess differences within disciplines.

RESULTS

For the larger study, surveys were mailed to 5,364 persons and 3,223 surveys were completed. Of the returned

surveys, 241 were considered ineligible due to lack of patient contact, retirement, or incorrect address, for an adjusted overall response rate of 63% in the larger study following two mail reminders and a follow-up phone call.²⁴⁻²⁶ Respondents and nonrespondents did not differ statistically on the basis of sociodemographic characteristics (age, gender, race).

Again in the larger study, participants were represented in the approximate distribution of their respective disciplines in the state: registered nurses accounted for two thirds (67%) of respondents, physicians represented 15%, licensed practical nurses 8%, and medical technologists 10%. The gender distribution was predominantly female (84%), except for physicians, consistent with the population. The majority (90%) reported hospital practice.

Primary worksites included general inpatient units (26%), physician offices or clinics (18%), operating rooms (10%), and clinical labs or blood banks (9%). Many worked in more than one clinical setting. The median health care experience was 17 years since initial clinical training. The median period at risk for exposure (direct patient care or handling specimens) was 32 hours per typical week.

The following analysis is based on results from a total of 1,362 respondents who answered a specific question that asked them to describe a time during the previous 3 months when they had not followed standard precautions. A total of 1,127 left the question blank, 106 wrote "not applicable," while 1,990 wrote a specific response (of those, 667 wrote "I can't remember one" or "I always comply"), leaving an adjusted within-survey response rate of 64% ($1,990/3,223$ minus 106). In cases where the respondent described more than one incident, coders were instructed to code the first incident mentioned. We have grouped the responses into 9 types of incidents. Illustrative statements for each group follow in Table 1.

The most common incidents were those in which respondents believed that stopping to follow precautions would have put the patient at risk ($N = 304$, 22% of responses).

"A baby was crowning just as I walked into the room, and [the baby] was covered with meconium; the baby was delivered in 15 seconds and I initiated and suctioned the meconium prior to the first breath. To take time to put gloves on may have endangered the baby's life."

"[I] got the mom up out of bed and blood began gushing everywhere—down her legs all over the floor and I could not let go of her to get gloves on. Patient safety took priority over my safety."

These descriptions suggest that time was of the essence. Respondents were convinced that taking a few seconds to follow precautions would have endangered the patient's safety.

Another common category for nonadherence involved the belief that following precautions would interfere with the respondent's ability to provide patient care ($N = 267$, 20% of responses).

"At times I have only worn one glove when starting a difficult IV in order to gain optimal success. I know that I must

Table 1. Description of Break in Standard Precautions and Association with Injury, Exposure, and Nonadherence Among 1,362 Workers Reporting an Incident

Reason Given	Number (%)	% Who Had a Sharps Injury (Past 3 Months) N = 470	% Who Had a Mucocutaneous Exposure (Past 3 Months) N = 681	% Who Did Not Wear Gloves Routinely N = 561 [†]	% Who Did Not Wash Hands Routinely N = 813 [§]
Belief that stopping to comply would have put the patient at risk	304 (22)	38	52	42	58
Belief that complying with precautions interfered with ability to provide care	267 (20)	30	50	61 [†]	59
Disagreed with need to comply in a given situation	186 (14)	34	49	44	68
Exposure was not anticipated	186 (14)	37	59 [†]	34	61
Patient care demands led to being in a hurry and did not take time to comply	144 (11)	40	49	37	69
Equipment needed to comply was not available	102 (7)	36	41	42	48*
Forgot to use precautions	78 (6)	23*	40	30*	50
Belief that the patient did not pose a risk	58 (4)	38	45	56 [†]	79 [†]
Equipment needed to comply was not effective	37 (3)	36	49	22	59
Overall	1,362	34	42	44	61
Confidence interval for proportion (95% CI)		25 to 43	32 to 52	34 to 54	51 to 71

* Proportions that fell outside the confidence interval for the overall proportion.

[†] Proportions that were higher.

[‡] "What percent of time do you typically wear gloves when performing an invasive procedure (e.g., drawing blood)?" Routinely = 100% of the time.

[§] "What percent of time do you typically wash your hands after patient contact before caring for the next patient?" Routinely = 100% of the time.

be sure to use my gloved hand then to clean up any blood at site. At times this is easy—especially with compliant patients, but at times you wish you had both gloves on."

"When IV sites are a premium and I need to restart the IV for the baby, I am more confident not wearing gloves—it is much easier to feel in the vein with naked fingers. The key here may be babies—their veins are small and BP is frequently lower—sometimes a flashback is not noted until it is too late."

These incidents refer to particularly difficult patient care situations, in which respondents believed that direct touch (as opposed to touch through gloves) may be required in order to provide optimal patient care. These respondents do not appear to reject use of gloves in routine situations.

In some cases, a respondent made a choice not to follow precautions because he or she disagreed with the need for precautions in a particular circumstance (N = 186, 14% of responses).

"I recap my needles because I think it is safer than the alternatives. I have stuck myself once in 17 yrs and that was over 12 yrs ago."

"I frequently recap needles. I was stuck once by someone turning to put an uncapped needle in the sharps container."

Each of these respondents puts a slightly different slant on recapping needles, which they believed represented a safer method than that recommended under standard precautions.

In some cases, the exposure was not anticipated but the situation was not an emergency (N = 186, 14% of responses).

"I was fluffing a pillow for a patient admitted with abdominal pain. He instantly sat up and had a projectile emesis of bright red blood. Before I could get to the other side of the room for gloves and masks, I was splattered with blood."

In this case, the respondent would not have been expected to use precautions, yet exposure occurred.

In other cases, not following precautions was attributed to being in a hurry because of challenging work and time pressures (N = 144, 11% of responses).

"On a daily basis we do blood glucose monitoring which tends to pile up at 4:00 PM and 9:00 PM. In order to get them all done in time, we change gloves in between, but rarely wash hands. On day shift, people have been known to not change gloves. A lot of stress is put on us to be fast, rather than thorough."

This respondent described time pressures under which even those with the best intentions may have difficulty following precautions.

In others, respondents noted that proper equipment was not available when needed (N = 102, 7% of responses).

"After giving an injection I had to carry a sharp to another home to dispose of it, because there was no sharp container in home I gave injection in—sometimes sharp containers are very full and you can easily stick your fingertip when trying to dispose of the sharp."

In this case, the home in question simply did not have a sharps container available.

Less commonly, the respondent's typical practice and intention was to use precautions but he or she simply forgot ($N = 78$, 6% of responses).

"Usually you catch yourself non-compliant at a time when you can't stop as it is too late—such as giving an injection without using gloves. I do try at all times to stay in adherence, but I would be lying if I told you I do 100% of the time."

"[I heard a] loud thud from a patient's room. Found patient laying face down on floor. Patient was not breathing and only brief, faint, pulse felt.... Several nurses turned patient to back—I placed my hand under head to support it as we turned him. I was so concerned about it, I didn't think to put on gloves and got a handful of blood from head wound where the patient had hit forehead on floor."

Occasionally, even the most conscientious health care worker will forget to use precautions. Indeed, it may be the most conscientious ones who forget, as it is part of their routine to use precautions.

Some respondents elected not to use precautions because they believed that a particular patient was low-risk ($N = 58$, 4% of responses).

"I was not wearing gloves when cleaning up after stitches put in a child because it was a 2-year-old and I didn't think he had much chance of being a carrier of anything."

"I drew blood from a patient I've taken care of for 30 years and didn't put on gloves."

In both of these cases, the respondent knew that precautions would have been recommended.

Occasionally respondents noted that the available equipment was not effective ($N = 37$, 3% of responses).

"[I] took gloves off before I should have [in order] to tape an IV down. I think if we used better gloves, ones that fit better, we could feel better through them instead of all this air in the ends of the fingers."

"This particular day I couldn't find any goggles to fit me, ones they had slipped off all the time. I felt not wearing them would not interfere with discontinuing the IV. I didn't want them to fall in the area I was working in."

In these cases, the respondent decided that using no equipment was preferable to using faulty equipment.

Differences by Discipline

Physicians were less likely than those from other disciplines to describe an incident at all (29% of physicians described an incident, compared to 52% of nurses and 53% of laboratory technicians; confidence interval [CI] for overall sample, 42 to 62). On the other hand, the types of incidents described within each of the disciplines were similar to those described by the overall sample, with the following exceptions: lab technicians were more likely than the overall sample to report an incident in which they believed complying would have interfered with patient care (43% of incidents described, compared to overall average of 20%;

CI, 12 to 28) and to say they disagreed that adherence was necessary in a particular patient care encounter (28%, compared to an overall average of 14%; CI, 7 to 21); physicians were more likely than the overall population to say they had failed to follow precautions because they believed the patient to be low risk (14%, compared to 4% of overall sample; CI, 0 to 8).

Exposure Rates Across Categories

To examine differences in exposure rates across categories, we calculated a confidence interval for the overall exposure rates for all respondents who reported an incident of a break in standard precautions. In terms of sharps injuries, only 23% of those who said they had forgotten to use precautions had experienced a sharps injury in the past 3 months, which was lower than the overall rate (34; CI, 25 to 43). In terms of mucocutaneous exposures, those who had not anticipated exposure had a higher exposure rate (59% compared to 42%; CI, 32 to 52). All other categories fell within the confidence interval for injury or exposure.

Nonadherence Across Categories of Reasons for Nonadherence

We then looked at nonadherence to standard precautions across categories. Nonadherence to routine glove use (routine glove use defined as 100% of the time) was higher among those respondents who believed that adherence interfered with their ability to provide care (61% did not wear gloves all of the time compared to the overall rate of 44%; CI, 34 to 54) and among those who believed that the patient did not pose a risk (56% did not wear gloves all of the time). On the other hand, the proportion of those who did not use gloves routinely was lower among those who said a break in precautions occurred because equipment was not effective (22% did not wear gloves all of the time) and among those who forgot (30% did not wear gloves all of the time).

In terms of not washing hands, 79% of those who did not believe that the patient posed a risk said they did not wash their hands every time (higher than the overall rate of 61%; CI, 51 to 71). In contrast, 48% of those who said equipment needed to follow precautions was not available said they did not wash their hands every time, a rate that was lower than the overall rate.

DISCUSSION

The categories identified here provide insight into the community hospital-based health care worker's point of view regarding use of standard precautions. For example, the most common reason noted for an incident of nonadherence was concern on the part of the respondent that stopping to use precautions would have put the patient at risk. Standard precautions training should therefore reassure trainees that the short time it takes to use precautions

in most cases would not pose a risk to the patient and that the risk to patients of not following precautions should be considered.

Similarly, unexpected exposures were a surprisingly common reason for breaks in standard precautions. It is worth noting that this group had the highest rate of recent mucocutaneous exposures. Careful surveillance at an institutional level, including reporting and feedback of data on exposures, might identify some of the unexpected exposures and reduce their occurrence. To be effective, such a program would encourage reporting of adherence and injury using a nonjudgmental approach to providing feedback.^{27,28}

One potentially fruitful avenue for intervention would be ascertaining health care workers' beliefs and addressing them directly. In this study, for example, nonadherence with glove wearing was highest among those who believed that adherence interfered with care. In that case, interventions should give workers who feel clumsy using gloves the opportunity to practice their technique while wearing gloves. On the other hand, nonadherence with handwashing was highest among those who perceived patients to be low risk. As noted in another study of health care workers in rural areas, this may be due in part to the increased likelihood that rural nurses are more likely to know and therefore trust their patients.²⁹ Training should emphasize that patients may carry blood-borne infection that the health care worker would not predict, and while the risk may be low, it is not zero.

Finally, there were several categories of nonadherence that would require institutional solutions. For example, workers reported that needed equipment was either not available or did not function properly. They also noted that excessive patient care responsibilities did not allow sufficient time for them to follow recommendations completely. Reported nonadherence was the lowest among these groups, suggesting that workers had the intention to follow precautions and would do so if provided the appropriate equipment or given a reasonable workload that would allow them to follow their intentions.

We recognize several potential limitations to this study. First, although it is a statewide sample, results may not be generalizable to a national population. Second, those who reported an incident may not be representative of all health care workers, as they may, for example, have higher levels of concern about exposure than other health care workers. Third, because it is a retrospective study, it is difficult to determine whether the reasons given would be the same reasons that would have been given at the time the incident occurred. Finally, health care workers might be less likely to attribute the reasons for nonadherence to themselves, which means some of these results should be interpreted with caution.

On the other hand, the study has a number of strengths. Data were collected from a large sample of community hospital-based health workers from a number of institutions. The qualitative analysis was performed on a

large number of events, enhancing the likelihood that the events are representative. In addition, the study demonstrates a unique application of qualitative and quantitative methods to address a difficult problem. Finally, and most importantly, a deeper understanding of community hospital-based health care workers' own interpretation of their reasons for not following standard precautions in a specific situation may guide development of interventions to prevent such incidents from occurring in the future.

The authors appreciate the support of the Iowa Department of Public Health, as well as the suggestions of Dr. Larry Murphy and Dr. James Grosch of the National Institute of Occupational Safety and Health, Centers for Disease Control and Prevention, in providing scientific input into the design and conduct of this study. Finally, we are indebted to the community hospital-based health care workers who participated in the study.

This work was partially supported by CDC/NIOSH Cooperative Agreement U60/CCU172173.

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