ARTICLES

Hospital safety climate and its relationship with safe work practices and workplace exposure incidents

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Background: In the industrial setting, employee perceptions regarding their organization's commitment to safety (ie, safety climate) have been shown to be important correlates to both the adoption and maintenance of safe work practices and to workplace injury rates. However, safety climate measures specific to the hospital setting have rarely been evaluated. This study was designed to develop a short and effective tool to measure hospital safety climate with respect to institutional commitment to bloodborne pathogen risk management programs and to assess the relationship between hospital safety climate and (1) employee compliance with safe work practices and (2) incidents of workplace exposure to blood and other body fluids.
Methods: A questionnaire, which included 46 safety climate items, was developed and tested on a sample of 789 hospital-based health care workers at risk for bloodborne pathogen exposure incidents.
Results: A 20-item hospital safety climate scale that measures hospitals' commitment to bloodborne pathogen risk management programs was extracted through factor analysis from the 46 safety climate items. This new hospital safety climate scale subfactored into 6 different organizational dimensions: (1) senior management support for safety programs, (2) absence of workplace barriers to safe work practices, (3) cleanliness and orderliness of the work site, (4) minimal conflict and good communication among staff members, (5) frequent safety-related feedback/training by supervisors, and (6) availability of personal protective equipment and engineering controls. Of these, senior management support for safety programs, absence of workplace barriers to safe work practices, and cleanliness/orderliness of the work site were significantly related to compliance ($P < .05$). In addition, both senior management support for safety programs and frequent safety-related feedback/training were significantly related to workplace exposure incidents ($P < .05$). Thus the most significant finding in terms of enhancing compliance and reducing exposure incidents was the importance of the perception that senior management was supportive of the bloodborne pathogen safety program.
Conclusions: Hospital safety climate with regards to bloodborne pathogens can be measured by using a short, 20-question scale that measures 6 separate dimensions. Whereas all 6 dimensions are essential elements of overall safety climate, 3 dimensions are significantly correlated with compliance, and 1 dimension (senior management support) is especially significant with regard to both compliance and exposure incidents. This short safety climate scale can be a useful tool for evaluating hospital employees' perceptions regarding their organization's bloodborne pathogens management program. In addition, because this scale measures specific dimensions of the safety climate, it can be used to target problem areas and guide the development of intervention strategies to reduce occupational exposure incidents to blood and other body fluids. (AJIC Am J Infect Control 2000;28:211-21)

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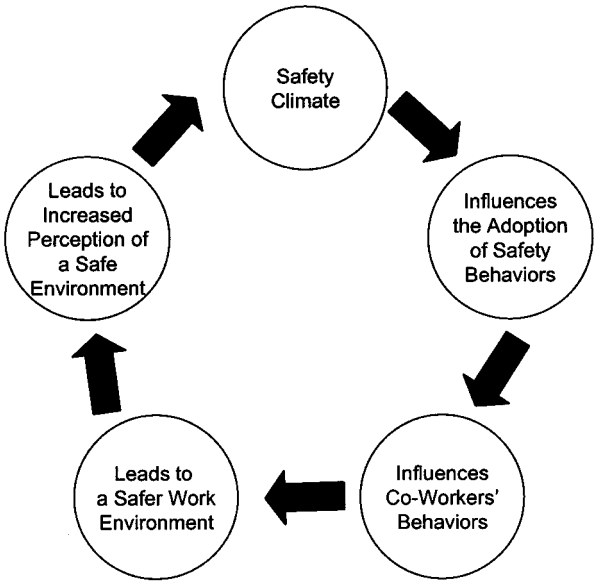

Fig 1. Influence of safety climate.

Research has identified a wide range of biological, physical, and chemical hazards in the hospital work environment, and recent research has added biomechanical/ergonomic hazards to the list of harmful exposures.[1-5] Another class of exposures in hospital environments could be labeled "nonphysical" or psychosocial, and perhaps the best known of these is job stress. Risk factors associated with job stress, such as rotating shift work, heavy workload, lack of autonomy/control, and poor supervision have been linked to worker ill health and an increased risk of workplace injuries.[6-12]

However, one class of psychosocial factors that has not received much attention in health care research is "organizational culture and climate," which is created by the contextual or background factors, such as leadership style and institutional goals, that exist in all organizations and transcend the job/task level. Organizational culture provides the background against which day-to-day tasks are performed and exerts a powerful influence on worker perceptions of job characteristics and organizational functioning.[13-16] An important example of organizational culture is "safety climate."

Safety climate refers to the "summary of perceptions that employees share about the safety of their work environment."[17] Employees' safety-related perceptions are based on several factors, including management decision making, organizational safety norms and expectations, and safety practices, policies, and procedures. These factors all communicate an organization's commitment to safety. Employees' perceptions about safety are important because organizations with strong safety climates consistently report fewer workplace injuries than do organizations with weak safety climates.[18-19] Organizations with strong safety climates have fewer employee injuries not only because the workplace has well-developed and effective safety programs, but also because the very existence of these programs sends "cues" to employees regarding management's commitment to safety. Evidence shows that if the organization is serious about adherence to safe work practices, then employees are more likely to comply (Fig 1). In other words, a safe environment supports and reinforces individual safety behaviors, and this in turn further affects behavior because of the influence workers have on one another. As safety behaviors are adopted throughout an organization, increasing pressure is put on noncompliers to come "in line." A good example of this effect is the pressure on health care workers to follow isolation precautions when caring for infectious patients. The converse of this is also true. For example, health care workers, especially those in positions of influence and power, who fail to follow infection control guidelines can have a chilling effect on their co-workers' behavior.

Most of our knowledge about safety climate comes from the manufacturing and heavy industry work settings where it was first studied.[17] This early research identified several key aspects or components of safety climate, including management's involvement in safety programs, high status and rank for safety officers, strong safety training and safety communications programs, orderly plant operations, good housekeeping, and an emphasis on recognition for safe performance rather than a reliance on punishment and enforcement.[20-24] Whereas the recognition of the importance of safety climate to productivity, cost, quality, and employee satisfaction has been realized in some industrial sectors, health care has not given safety climate the same attention. Generally speaking, hospital employees' perceptions regarding safety are rarely formally evaluated or considered during the design or updating of safety programs.[25] This issue is particularly important for the health care workplace because recent studies have linked global measures of safety climate to employee compliance with safe work practices and to incidents of exposure to blood and other body fluids.[26-29] Because exposure incidents, regardless of the outcome, may be extremely burdensome to employees as well as to organizations, improving our understanding of safety climate may have far-reaching implications.[30-33]

Safety climate may be growing in importance as the health care environment increasingly emphasizes reengineering, restructuring, and improved productivity. Hospital-based health care workers have to work harder and faster than ever within an environment of increased patient turnover, increased patient acuity levels, higher patient prevalence rates for infectious dis-

eases, and less time available for training and educational programs (with a subsequent overreliance on self-study training packets).[34-38] All of these factors may inadvertently increase the risk of exposure incidents for hospital employees, thereby making safety climate even more important in this time of change.

To develop a simple, yet effective, measure of hospital safety climate that is specific for bloodborne pathogen management and to ascertain its relationship to safe work behavior and workplace blood and body fluid exposure, a cross-sectional survey of health care workers was conducted.

METHODS

Study sample

In 1997, as part of a larger study on total quality management in hospitals, we collected questionnaire data on safety climate. A stratified sample of employees from a large (1000+ beds), urban research medical center with more than 200 separate clinical services and a level III trauma facility was selected from hospital departments considered at risk for blood and body fluid exposures (eg, critical care, pathology, surgical services, emergency department, and obstetrics and gynecology). The sample population was further stratified by job title (eg, clinical nurse, phlebotomist, and physician) so that, as much as was feasible, only employees with the highest risk for blood and body fluid exposure were selected.

A total of 1240 questionnaires was mailed to employees' work addresses. The mailing packet consisted of a cover letter, disclosure letter, consent form, questionnaire, and preaddressed return envelope. Several follow-up mailings were sent to nonresponders. All procedures involving human subjects were approved by The Johns Hopkins University School of Public Health Committee on Human Research and by the hospital's committee on human subjects. Complete information on the safety climate questionnaire survey, including copies of coding information, may be obtained by writing the corresponding author (R. R. M. G).

Study questionnaire

A new study questionnaire was developed on the basis of our earlier research.[27-29] The new questionnaire was guided by intensive qualitative data generating techniques such as focus groups, structured interviews, and work site surveys. In addition, preexisting safety climate scales were examined and, whenever possible, items from these scales were restructured and included in a working draft questionnaire. This draft survey was then subjected to cognitive testing and extensive pilot testing to determine its validity and reliability. The survey measured 4 major constructs: (1) safety climate, (2) demographics, (3) self-reported compliance rates, and (4) exposure history. The final 5-page questionnaire contained 99 items and was written at a 12th-grade reading level. There were 46 safety climate items included in the questionnaire, and these covered 9 major dimensions, which are detailed in Appendix A. Respondents answered each safety climate question by using a 5-point Likert scale (strongly agree to strongly disagree).[39]

Demographics

Ten questions were used to obtain information on employees' age, sex, education, occupation, work schedule, supervisory status, etc.

Compliance

A well-defined and well-characterized 14-item Universal Precautions compliance scale, which we developed and tested previously in several earlier studies, was used to measure compliance.[27-29] For the current study, "strict compliance" was defined as a "score" of ≥80% for all the applicable items. Again, a 5-point Likert scale was used for responses.[39]

Exposure incident history

Employees were asked about 4 types of blood and body fluid exposure incidents, including needlestick injuries, splashes to eyes or mouth, contacts with open wounds, and cuts with sharps objects. The employees were asked to report the number of each type of exposure incident they had experienced in the previous 6 months; at least one exposure would place them in the "exposed" group.

Statistical analyses

All analytical techniques were performed by using STATA statistical software (STATA 5.0, 1984, Stata Corporation, College Station, Texas). After data cleaning and editing procedures, 4 stages of statistical analyses were conducted. First, an array of descriptive statistics (frequency distributions, cross-tabulations, measures of central tendency, and dispersion) was performed. At the second level of analysis, the 46-item safety climate construct was factor analyzed by using varimax rotation, and all factored subscales were normalized where necessary. Cronbach's α was calculated for each factor extracted.[40] In the third stage, bivariate associations were performed to examine associations between each dimension of safety climate and demographic variables with 2 separate outcomes: compliance with safety practices at work and bloodborne exposure incidents. These associations were examined by

Table 1. Demographic characteristics of responders to the questionaires

Variable	N	Percentage of respondents
Sex		
Female	635	85.4
Male	109	14.6
Job category		
Nursing*	481	74.9
Technician†	140	21.8
Physician	21	3.3
Hours per week		
<40	195	26.3
≥40	547	73.7
Supervisory status		
No	639	86.1
Yes	103	13.9
Education		
≤14 years	238	33.2
>14 years	479	66.8
Job tenure, y	Sample mean = 7.9, 1-40 (range)	
Age, y	Sample mean = 37.2, 20-64 (range)	

*For example, registered nurses, licensed practical nurse, nurse practitioners.
†For example, phlebotomists, medical technicians, radiologic technicians, surgical technicians.

using simple logistic regression models. Finally, in the fourth stage, independent, stepwise multiple logistic regression models (ie, separate models for compliance and exposure incidents) were performed. Only variables that were found to be significantly associated at the bivariate level were included in the regression models.

RESULTS

Demographics

Completed questionnaires were obtained from 789 employees (a response rate of 60%). The respondents were predominately women (85%), with a mean age of 37 years (range, 20-64). The majority of respondents were well educated (67% college educated) and employed as nurses (75%). The employees had an average of 8 years of job tenure (range, 1-40 years). The complete demographic profile of respondents is presented in Table 1.

Safety climate

The 46 safety climate questions were factor analyzed, and 6 separate factors were extracted: (1) demonstrable management support for safety programs (4 items, α = .84), (2) the absence of hindrances to safe work practices (3 items, α = .80), (3) availability of personal protective and engineering control equipment (2 items, α = .78), (4) minimal conflict and good communication among staff members (3 items, α = .74), (5) frequent safety-related feedback/training by supervisors (5 items, α = .71), and (6) cleanliness and orderliness of the work site (3 items, α = .73). The scale items that did not factor into reliable scales were eliminated from additional analyses. Exemplars for each of the safety climate factors or dimensions are shown in Table 2. It is noteworthy that employees gave the highest mean scores for the dimensions measuring personal protective and engineering control equipment availability, senior management support, and absence of job hindrances. Employees gave the lowest scores for departmental conflict and workplace cleanliness. Thus the hospital received very good scores for personal protection availability and poor scores for the physical work environment and for interpersonal communication.

Compliance

Respondents' compliance with safety practices was generally quite good, with reported scores highest for proper disposal of biomedical waste (90%), proper disposal of sharps (93%), wearing disposable gloves when indicated (82%), and taking special care with sharp objects such as scalpels (92%). The lowest rates of compliance were reported for recapping contaminated needles (32% sometimes or more frequently recapped), wearing disposable face masks to prevent splashes to the face and mouth (36%), wearing protective eye shields (41%), and unscrewing needles from needle holders (59%). These rates show improvement over previously reported rates (for this hospital) with identical items.[27] Compliance rates for each item are shown in Table 3.

Exposure incidents

Reported blood and body fluid exposure incidents were not uncommon; 67 employees (9% of all respondents) experienced a total of 104 needlesticks for the 6-month period before the study. About a third of the exposed employees reported experiencing two or more needlesticks within that period. Interestingly, respondents stated that 71% of all needlesticks were reported to the hospital's Employee Health Clinic, a substantial increase over previously reported rates.[27,41] A total of 81 employees (10% of all the respondents) experienced 97 splashes to the eyes or mouth. Of these, only 51% of the splashes were ever reported to the Employee Health Clinic. Twenty-five employees (3% of all the respondents) experienced 107 contacts with open wounds, and 21% of these incidents were actually reported to the Employee Health Clinic. Finally, 52 employees (7% of all the respondents) experienced 81 cuts with sharp objects; with only 33% ever reported to the Employee Health Clinic. Altogether,

Table 2. The 20-item hospital safety climate scale defined by each of its six organizational dimensions (N = 789)

Factor	Percentage responding "strongly agree" or "agree"*
Personal protective and engineering control equipment availability (Cronbach a = .78, mean = 8.9)	
1. Sharp containers are readily accessible in my work area.	91.4
2. Disposable gloves are readily available in my work area.	94.1
Management support (Cronbach a = .84, mean = 8.3)	
3. The protection of workers from occupational exposures to HIV is a high priority with management where I work.	85.6
4. On my unit, all reasonable steps are taken to minimize hazardous job tasks and procedures.	84.6
5. Employees are encouraged to become involved in safety and health matters.	75.7
6. Managers on my unit do their part to insure employees protection from occupational HIV/AIDS.	76.1
Absence of job hindrances (Cronbach a = .80, mean = 8.3)	
7. My job duties do not often interfere with my being able to follow Universal Precautions.	79.1
8. I have enough time in my work to always follow Universal Precautions.	79.5
9. I usually do not have too much to do so that I can always follow Universal Precautions.	77.1
Feedback/Training (Cronbach a = .71, mean = 7.8)	
10. On my unit, unsafe work practices are corrected by supervisors.	70.2
11. My supervisor often discusses safe work practices with me.	32.8
12. I have had the opportunity to be properly trained to use personal protective equipment devices so that I can protect myself from HIV exposures.	83.9
13. Employees are taught to be aware of and to recognize potential health hazards at work.	80.2
14. On my unit, a copy of the hospital safety manual is available.	95.2
Cleanliness/orderliness (Cronbach a = .73, mean = 6.5)	
15. My work area is kept clean.	65.7
16. My work area is not cluttered.	46.7
17. My work area is not crowded.	40.5
Minimal conflict/good communication (Cronbach a = .74, mean = 6.4)	
18. There is minimal conflict within my department.	42.0
19. The members of my unit support one another.	38.0
20. On my unit, there is open communication between supervisors and staff.	67.9

*Strongly disagree = 1, disagree = 2, neither disagree or agree = 3, agree = 4, strongly agree = 5.

389 blood and other body fluid exposure incidents were reported by respondents for the 6 months preceding the questionnaire. Unfortunately, we do not have questionnaire data detailing these exposure incidents, although information from the Employee Health Clinic suggests that, at least for open wound contact, most incidents were related to blood coming into contact with cuts on employees' hands. These results are shown in Table 4.

ASSOCIATIONS WITH SAFETY CLIMATE

Safety climate and compliance with safe work practices

Compliance was most strongly associated with cleanliness and orderliness of the work site (odds ratio [OR] = 3.3, 95% CI, 2.2-4.9). In other words, health care workers who reported that the work site was clean and orderly were more than 3 times more likely to report adherence to safe work practices (this is roughly a 300% greater likelihood). Compliance was also significantly associated with senior managerial support (OR = 2.3, 95% CI, 1.5-3.4) and the absence of job hindrances (OR = 1.5, 95% CI, 1.0-2.3). Compliance was also significantly associated with several demographic factors; women and younger employees were more likely to comply, as were employees with fewer than 14 years of education. All of the significant associations are shown in Table 5. Safety climate and demographic factors accounted for 14% of all compliance behaviors (r^2 = 0.14), a relatively large and significant finding.

Safety climate and exposure incidents

In a stepwise multivariate multiple logistic regression model that included each of the 6 safety climate dimensions, demographic factors, and compliance behaviors, all as independent variables, we found that the frequency of exposure incidents was significantly lower when senior managerial support was rated highly (OR = 0.56, 95% CI, 3.8-0.81) and when employees reported safety feedback and training (OR = 0.42, 95% CI, 0.21-0.82) (Table 6). Thus, employees who perceived strong senior management support for safety and who received high levels of safety-related feedback and

Table 3. Percentage of employees' self-reported compliance with Universal Precautions (N = 789)

Item	Percentage responding "always" (ie, strict compliance)
1. Dispose of sharp objects into a sharps container.	92.7
2. Take special caution when using scalpels or other sharp objects.	91.8
3. Dispose of all potentially contaminated materials into a red (and/or labeled) bag for disposal as biomedical waste.	90.4
4. Wear gloves while drawing a patient's blood.	87.1
5. Wear disposable gloves whenever there is a possibility of exposure to blood or other bodily fluids.	81.9
6. Never eat or drink while working in an area where there is a possibility of becoming contaminated with blood or body fluids.	71.2
7. Never recap needles that have been contaminated with blood.	68.3
8. Wash my hands after removing my disposable gloves.	65.5
9. Treat all materials that have been in contact with patient's saliva as if they were infectious.	65.5
10. Promptly wipe all potentially contaminated spills with a disinfectant.	60.8
11. Never unscrew needles from needle holders that have been used to draw patient's blood.	58.9
12. Wear a disposable outer garment that is resistant to blood and bodily fluids whenever there is a good chance of soiling my clothes.	43.0
13. Wear protective eye shields whenever there is a possibility of a splash or splatter to my eyes.	40.5
14. Wear a disposable face mask whenever there is a possibility of a splash or splatter to my mouth.	35.9

Table 4. Employees' reported blood and body fluid exposure incidents in the previous 6 months

Exposure incident type	No. of exposed workers	Percentage	No. of total exposure incidents	No. of exposure incidents reported to employee health	Percentage actually reported
Needlesticks	67	9	104	74	71
Splashes	81	10	97	49	51
Direct contacts	25	3	107	22	21
Cuts	52	7	81	27	33

Table 5. Multiple logistical regression of demographics and safety climate subfactors with strict compliance as the outcome*

Item	OR	95% CI
Cleanliness	3.30	2.20-4.90
Sex (females)	3.00	1.60-5.60
Managerial support	2.30	1.50-3.40
Absence of job hindrances	1.50	1.00-2.30
Age (≤37)	1.00	1.00-1.10
Education ≥14 y, college associate level	0.62	0.41-0.95

*r^2 = .14.

training were *half as likely* to experience blood or body fluid exposure incidents.

DISCUSSION

These results indicate that safety climate is an important contextual variable in the hospital environment and is correlated with employees' compliance with safe work practices and with workplace exposure incidents. Thus employees' perceptions about the safety of their hospital significantly influences their adoption of safe work practices, which could range from the use of barrier protective devices to consistent and correct use of safety needle devices, to adherence to vaccination recommendations and much more. This new hospital safety climate scale can be a valuable assessment tool for hospitals and part of their overall risk management program, which is especially important given the seriousness of potential outcomes. In the hospital where the study was conducted, the patient prevalence rates for bloodborne pathogens is high; the rates in adult emergency department patients are 12% for HIV, 5.1% for hepatitis B virus, and 18.2% for hepatitis C virus.[42,43] However, even in hospitals with lower rates, the adverse effect of exposure incidents on both employees and the organization is so great that efforts to improve hospital safety climate will almost certainly be highly cost-effective. Administrations that are supportive of strong safety

climates will not only improve compliance with safe work practices, thereby reducing exposure risk, but will also benefit from the far-reaching implications inherent in the safety climate message. When employee safety is considered and valued, employees feel valued. However, whereas the hospital safety climate scale can be an extremely useful tool to guide improvements in the bloodborne pathogen management program, it can backfire if it is used to collect information that is not acted on. If employees are asked for input but then the input is ignored, they may come to feel (even more) disengaged from the organization.[44] Therefore, hospitals that collect information about their bloodborne pathogens management program by using the hospital safety climate scale should be prepared to act on shortcomings that are identified. This is a perfect opportunity for infection control personnel to work in concert with safety personnel. This is especially necessary because improving a hospital's safety climate is a complex process, demanding the full and enthusiastic participation of all safety and health management and staff. Their cooperation and collaborative efforts toward improving the safety, health, and well being of hospital staff will send a powerful message to employees thereby communicating management's sincerity and commitment to safety.

Several aspects of this study need to be addressed. First, health care worker self-reports (using similar measures over time) of compliance appear to be improving. Especially noteworthy is the decreased reliance on recapping of needles, probably a result of increased accessibility to sharps containers and an increasing reliance on safety needle devices. Second, exposure incident rates remain high, even with the increase in safety needle devices (eg, needleless intravenous catheters). This rate may be a reflection of increased reporting, increased patient acuity levels (ie, more complex procedures performed on patients in a shorter period), or a reflection of institutional changes (ie, decreased reliance on phlebotomy teams and increased reliance on temporary nursing personnel) in phlebotomy practices.[45,46] Third, the usefulness of the safety climate measure is dependent on several factors, including who is responsible for conducting the survey, confidentiality (or ideally anonymity) of respondents, and most important, the necessary follow-up to the survey findings.

To maximize the effectiveness of the hospital safety climate scale, the following recommendations are made:

1. A safety climate survey that uses the safety climate scale, should be sponsored jointly by the infection control and safety committees or by the corporate or institutional infection control and safety committee.
2. The survey should be administered to all employees to keep the responses anonymous. Surveys can be distributed at departmental meetings, and a preaddressed, in-house envelope can be provided for returns.
3. Responses can be entered quite easily onto any database program already available in-house. For most institutional purposes, simple descriptive statistics, such as frequencies, are sufficient. For more complex analyses, such as determining the relationship between compliance outcomes and safety climate, we recommend obtaining any well-known statistical software program. If necessary, outsource the analyses to a local college department of statistics.
4. The results of the safety climate survey can be used in several ways. First, scores on the 6 dimensions can be ordered from high to low, and the dimensions with the lowest scores can be targeted for improvement. Second, safety climate can be measured before and then again after any major organization-wide safety initiative, such as the introduction of a new safety device or safety training module. Third, the safety climate survey can be used to compare hospital departments or campuses within a hospital system. This comparison can identify areas requiring special attention. Fourth, the survey can be used to trend improvements in the overall safety program over time and thus can be a useful quality indicator serving as one of several safety program monitors. Fifth, because the safety climate survey provides management with valuable employee feedback, it can be a powerful tool for change. Ideas for individual programmatic interventions targeting each subfactor are presented in Appendix B**.** Again, the survey can be used before and then after any of the interventions are implemented.

Table 6. Multiple logistical regression of demographics and safety climate sub-factors with exposure incidents as the outcome

Item	OR	95% CI
Managerial support	0.56	3.80-0.81
Feedback and training	0.42	0.21-0.82

*r^2 = .30.

Limitations

This study has several potential limitations, including problems associated with cross-sectional design, which preclude the determination of causality. In other words, a person's compliance behavior could influence his or her perception of safety climate (or vice versa). Whereas we know that these two factors are associated, this study design cannot tell us whether safety climate predicts compliance or whether compliance predicts safety climate. It is also possible that prior bloodborne

pathogen incidents may affect perception of safety climate. Only a more lengthy (and costly) prospective design can determine this. Another limitation of these findings is their application to other hospitals, especially smaller, rural hospitals. Hopefully, as safety climate is increasingly measured, we will better understand its reliability in these other settings. Another important limitation to the study is the voluntary questionnaire format; mailed surveys typically have poor response rates and are subject to several response biases. Employees with strong feelings (negative or positive) may have been more likely to complete the survey, and the concern always exists regarding socially desirable responses. Finally it needs to be pointed out that this new hospital safety climate survey is designed to assess employees' perception of management commitment toward only one specific safety program—namely the bloodborne pathogen exposure management program. We are currently developing a global hospital safety climate scale that will allow hospitals to evaluate their overall safety programs (eg, including chemical management, radiologic management, employee health, infection control, and safety programs, etc). This new scale will be useful as an internal audit or assessment tool of the hospital's overall risk-management program.

In conclusion, our results indicate that the hospital safety climate scale can be a useful measure of a hospital's safety culture with respect to bloodborne pathogen management and that it is significantly associated with both compliance and with exposure incidents. Most important, hospitals can use the scale to identify problem areas in their bloodborne pathogen management program and target these for intervention. Given the potential seriousness of the problem, it is important for hospital administration to evaluate employees' perceptions regarding their risk-management programs and to address any shortcomings whenever feasible. On the basis of the earlier industrial models, future hospital studies might examine the effect of safety climate on employee job satisfaction, employee turnover, productivity rates, overall accident and incidence rates, and patient satisfaction. Additionally, more information on workplace interventions and how these affect safety climate is needed. Much more remains to be done in this exciting and challenging area.

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APPENDIX A

SAMPLE CLIMATE ITEMS ON THE QUESTIONNAIRE

Safety program elements

- A copy of the Occupational Safety and Health Administration Bloodborne Pathogens Standard is available in my work area.
- In my hospital, there is a safety committee.
- Health and safety inspections of my work area are conducted at least once a year.
- On my unit, a copy of the hospital's safety manual is available.
- On my unit, written safety policies are always available.

Support for safety programs

- Where I work, employees are encouraged to make suggestions for improving work safety.
- Investigations of reported accidents are top priorities where I work.
- Exposures to blood/bodily fluids from HIV/AIDS patients are always investigated.
- On my unit, all reasonable steps are taken to minimize hazardous job tasks and procedures.
- Employees are encouraged to become involved in safety and health matters.
- Managers on my unit do their part to ensure employee protection from occupational HIV/AIDS.
- Safety is regularly discussed at departmental meetings.
- My immediate supervisor is concerned about my safety on the job.
- On my unit, safety issues are considered when purchasing new equipment.
- On my unit, managers attend safety seminars.

Senior management support for safety

- The protection of workers from occupational exposure to HIV is a high priority with senior management where I work.
- On my unit, senior level management gets personally involved in safety activities.
- I believe that senior management attitudes about Universal Precautions influence employee behavior.
- I believe the ultimate responsibility for safety rests with top management.
- In my organization, no significant compromises or shortcuts are taken when worker protection from infectious diseases is at stake.

Communication and feedback about safety

- On my unit, employees, supervisors, and managers all work together to ensure the safest possible working conditions.
- There is minimal conflict within my department.
- The members of my unit always support one another.
- I feel comfortable reporting violations to my department supervisor.
- On my unit, communication is open between supervisors and staff.
- On my unit, unsafe work practices are corrected by supervisors.

- My supervisor often discusses safe work practices with me.
- If I were to experience a needlestick injury, I would report it.

Accountability and responsibility

- On my unit, my compliance with Universal Precaution procedures and practices is part of my annual written evaluation.
- Employees on my unit are rewarded for safe work behavior.
- Employees are disciplined or reprimanded when they fail to follow Universal Precautions.

Accessibility, availability, and quantity of safety equipment and supplies and engineering controls

- On my unit, personal protective equipment is readily available and accessible.
- I am provided with all of the necessary equipment and devices for me to protect myself from possible HIV exposures.
- Sharps containers are readily accessible in my work area.
- Disposable gloves are readily available in my work area.

Design, maintenance, and housekeeping of the work site

- My work area is kept clean.
- My work area is not cluttered.
- My work area is not crowded.

Training and education

- My hospital offers training classes or special seminars on bloodborne pathogens.
- I have had the opportunity to be properly trained to use personal protective equipment devices so that I can protect myself from HIV exposures.
- On my unit, managers encourage employees to attend safety seminars.
- Employees are taught to be aware of and to recognize potential health hazards at work.

Absence of job hindrances to safety

- My job duties do not interfere with my being able to follow Universal Precautions.
- I have enough time at work to always follow Universal Precautions.
- Staff is adequate for me to get my work done in a safe manner.
- I rarely have that much to do that it interferes with my ability to always follow Universal Precautions.

APPENDIX B

TARGETED INTERVENTIONAL STRATEGIES FOR SAFETY CLIMATE IMPROVEMENTS

1. Management support

Visible and tangible management support demonstrated by:

- High-level senior management serving on infection control and safety committees.
- Well-qualified safety and infection control professionals.
- Continuing educational support for safety and infection control professionals.
- Selection of membership to infection control and safety committees based on expertise, interest, enthusiasm, in addition to other requirements.
- Effective infection control and safety training for all managers.
- Managers and supervisors' evaluations based on their department safety data, including survey data.
- Managers/supervisors demonstrating high levels of good safety practices.
- Providing managers/supervisors with the necessary tools and structure to involve their employees in safety matters.

2. Job hindrances/facilitators

- Redesigning tasks to ensure that all workers have the ability to protect themselves when necessary.
- Transmitting information to employees regarding the need to protect themselves and still provide optimal patient care.

3. Personal protective equipment (PPE)

- Ensure that front line workers are in the decision-making process regarding safety devices (ie, they should serve on product evaluation committees or on purchasing teams).
- Revisit PPE periodically to ensure that new technologies are examined for their potential application in your institution.
- Set up PPE Total Quality circles to identify novel solutions to problem areas (eg, eye protection usage).

4. Conflict/communication

- Train managers/supervisors on conflict resolution and communication skills, and retrain periodically.
- Rotate staff through a safety liaison position on each unit. They could attend infection control and safety meetings and report back to their home departments during regularly scheduled department meetings.

- Periodically evaluate supervisors on their leadership abilities (ie, they should have annual evaluations).

5. Feedback/training

- Add compliance practices to both manager and staff performance appraisals.
- Evaluate all safety training (especially on new safety devices) to ensure that it is truly effective.
- If self-study packets must be used, update and revise them annually. When feasible, add simulation exercises to the safety curriculum.
- Put simplified short versions of safety policies online in the hospital network system.
- Train opinion leaders to serve as informal hands-on trainers, especially for house-staff and student trainees.
- Develop a simple feedback system to share facility-wide exposure data with all employees.

6. Cleanliness/orderliness

- Conduct frequent rounds to spot problems as they occur.
- Periodically reduce clutter in all departments (hold "spring cleaning" days).
- Involve employees on walk-through teams.