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Safety Climate Dimensions Associated with Occupational Exposure to Blood-Borne Pathogens in Nurses

James W. Grosch, PhD,[1]* Robyn R.M. Gershon, Dr PH,[2] Lawrence R. Murphy, PhD,[1] and David M. DeJoy, PhD[3]

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INTRODUCTION

A major occupational hazard facing over 11 million health care workers in the United States is accidental exposure to blood-borne pathogens, such as human immunodeficiency virus (HIV) and hepatitis B. Early attempts to reduce exposures focused on the development of engineering controls [Gerberding, 1993] (e.g., sharps containers) and reliance on government-backed guidelines, called Universal Precautions (UP), that prescribed safe work practices (e.g., not recapping needles, wearing gloves, etc.) for health care workers to follow [MMWR, 1994]. These approaches, while having limited success, led to the examination of other factors that might play an important role in reducing the risk of occupational exposure. Recent research involving nurses and other health care workers suggests that job and organization-level factors can have a powerful influence on safe work practices [DeJoy et al., 1995].

One organization-level factor, called safety climate, seems especially important. Safety climate is defined as shared perceptions of workers regarding the level of safety where they work, and typically consists of several dimensions, such as management commitment to safety, conflict among coworkers, cleanliness, feedback about safety, job hindrances, and availability of personal protective equipment. In health care workers, a strong safety climate has been found to be positively associated with compliance with UP and other safety-related behaviors [Gershon et al., 1995; Murphy et al., 1996].

The present study focused on three specific safety climate dimensions that were hypothesized to play an important role in promoting safe work practices in nurses, an occupational group clearly at risk for accidental exposure to blood-borne pathogens. The safety climate dimensions investigated were: management commitment to safety, job hindrances, and feedback/training. In this study, nurses were categorized according to their (a) safety-related work practices (low vs. high compliance with UP), and (b) recent accidents/injuries possibly involving exposure to blood-borne pathogens (non-exposed vs. exposed). These groups were then compared according to their perceptions of the hospital's three dimensions of safety climate. A major issue addressed in this study was whether compliance with UP would be associated with the same safety climate dimensions as accidents/injuries.

METHODS

As part of a larger research study, 177 clinical nurses in a large urban hospital completed a questionnaire designed to measure demographic characteristics (e.g., age, gender), safety climate, compliance with UP, and recent accidents/injuries potentially involving exposure to blood-borne pathogens. The average age of respondents was 35.0 years, 92.1% were female, and the average tenure was 4.9 years.

The safety climate was measured by having respondents indicate on a 5-point scale their level of agreement with a series of statements about the work environment. Three dimensions (or scales) emerged from factor analysis:

[1]National Institute for Occupational Safety and Health, Cincinnati, OH
[2] The Johns Hopkins University, School of Hygiene and Public Health, Baltimore, MD
[3]University of Georgia, School of Health and Human Performance, Athens, Georgia
*Correspondence to: James W. Grosch, PhD, National Institute for Occupational Safety and Health, 4676 Columbia Pkwy., MS-C24, Cincinnati, OH 45226. E-mail: jkg9@cdc.gov

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management commitment to safety (4 items, $\alpha = .82$), job hindrances (3 items, $\alpha = .81$), and feedback and training (5 items, $\alpha = .73$). Compliance with UP was measured with 14 items ($\alpha = .70$) that required respondents to indicate on a 5-point scale how frequently they engaged in specific work practices (e.g., not recapping needles). Respondents who answered ''always'' (as opposed to ''often'', ''sometimes'', ''rarely'', or ''never'') for at least 80% of the items were placed in the high compliance group, whereas respondents falling below 80% were placed in the low compliance group. Accidents/injuries were measured by asking respondents to report the number of needlestick injures, splashes, cuts, and other exposures that occurred during the previous six months. Respondents indicating no exposures were placed in the ''non-exposed'' group, while respondents indicating at least one exposure were placed in the ''exposed'' group.

In order to examine the safety climate dimensions associated with compliance with UP and accidents/injuries, a multivariate analysis of covariance (MANCOVA) was conducted for both variables. A MANCOVA controls the probability of Type I error produced by repeated comparisons and also allows safety climate scores to be adjusted for possible confounding variables. In this study, nurses in the low compliance group were compared with those in the high compliance group in terms of their perceptions of the three dimensions of safety climate, after adjusting for gender, age, tenure, and education. A similar comparison of safety climate was made for nurses in the non-exposed and exposed groups.

RESULTS

Table I presents zero-order correlations for the three safety climate dimensions, compliance with UP, and accidents/injuries. Compliance with UP was significantly associated with all of the safety climate dimensions. However, accidents/injuries were only significantly associated with the safety climate dimension of job hindrances. The correlation between compliance with UP and accidents/injuries was in the expected direction, but not statistically significant ($P = .15$).

Using Wilks' criterion, the MANCOVA analysis found an overall significant difference in safety climate for both compliance with UP ($F[3,169] = 3.71$, $P < .05$) and accidents/injuries ($F[3,169] = 7.44$, $P < .001$). Table II presents the adjusted means and standard deviations for the safety climate measures, as well as corresponding univariate F-scores. For compliance with UP, all safety climate dimensions were significantly different for the low and high groups. High compliance group nurses reported greater management commitment to safety, less concern regarding job hindrances, and more training/feedback. For accidents/

Table I. Zero-Order Correlations between Three Safety Climate Dimensions, Compliance With Universal Precautions (UP), and Accidents/Injuries in Survey of 177 Nurses, 1996–1997.

		1	2	3	4
1	Management commitment to safety				
2	Job hindrances	−.32**			
3	Feedback/Training	.56**	−.37**		
4	Compliance with UP (0 = low, 1 = high)	.18*	−.34**	.16*	
5	Accidents/injuries during past six months (0 = no, 1 = yes)	−.03	.22**	−.10	−.11

*$P < .05$; **$P < .01$

Table II. Results of Multivariate Analysis of Covariance (MANCOVA) Comparing Safety Climate Scores According to Compliance With Universal Precautions (UP) and Accidents/Injuries in Survey of 177 Nurses, 1996–1997.

	Compliance with universal precautions (UP)					Accidents/injuries				
	Low		High		Univariate	Non-exposed		Exposed		Univariate
Safety climate dimensions	M(A)	SD	M(A)	SD	F	M(A)	SD	M(A)	SD	F
Management commitment to safety	16.8	2.6	17.7	2.8	3.93*	17.0	2.9	17.0	2.3	0.01
Job hindrances	5.9	2.0	4.4	1.5	22.14**	5.2	1.9	6.2	2.2	9.50**
Feedback/training	19.3	2.8	20.3	3.0	4.30*	19.7	2.9	19.0	3.0	1.88

M(A) is the adjusted mean, controlling the effects of gender, age, tenure, and education. SD is the standard deviation.
Univariate F-tests were conducted comparing the adjusted means for Low vs. High Compliance groups, and for Non-exposed vs. Exposed groups. Higher adjusted mean scores indicate more of a particular safety climate dimension.

*$P < .05$; **$P < .01$

injuries, only the dimension of job hindrances was significantly different, with non-exposed nurses reporting less concern over job hindrances.

CONCLUSIONS

These finding are consistent with those from previous research [DeJoy et al., 1995; Gershon et al., 1995; Murphy et al., 1996] and additionally suggest that safety climate plays a larger role in a nurse's compliance with UP than it does in accidents/injures. This may be partly due to the relatively low base rate associated with accidents/injuries. Approximately 27% of respondents reported some type of exposure in the past six months. Another factor may be that compliance with UP involves behaviors that are under the control of the worker, whereas accidents/injuries can occur regardless of a worker's actions or compliance with UP. Finally, the occurrence of an accident/injury may also result in heightened concern over safe work behavior and organizational factors, thus raising scores on some dimensions.

The safety climate dimension of job hindrances appears to be especially critical since it was the only safety climate dimension associated with both high compliance with UP and the absence of accidents/injuries. The finding that the safety climate dimensions associated with UP compliance and accidents/injuries, while overlapping, were not identical, suggests that different intervention strategies for nurses may be appropriate, depending on whether the focus is on promoting greater compliance with UP or reducing accidents/injuries.

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