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Differences in Hospital Managers', Unit Managers', and Health Care Workers' Perceptions of the Safety Climate for Respiratory Protection

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Abstract

This article compares hospital managers' (HM), unit managers' (UM), and health care workers' (HCW) perceptions of respiratory protection safety climate in acute care hospitals. The article is based on survey responses from 215 HMs, 245 UMs, and 1,105 HCWs employed by 98 acute care hospitals in six states. Ten survey questions assessed five of the key dimensions of safety climate commonly identified in the literature: managerial commitment to safety, management feedback on safety procedures, coworkers' safety norms, worker involvement, and worker safety training. Clinically and statistically significant differences were found across the three respondent types. HCWs had less positive perceptions of management commitment, worker involvement, and safety training aspects of safety climate than HMs and UMs. UMs had more positive perceptions of management's supervision of HCWs' respiratory protection practices. Implications for practice improvements indicate the need for frontline HCWs' inclusion in efforts to reduce safety climate barriers and better support effective respiratory protection programs and daily health protection practices.

Keywords

program planning and evaluation; occupational health and safety programs; organizational culture/climate; research

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Conflict of Interest

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Health care personnel (HCP) who work in hospitals are at high risk for work-related injuries and illnesses compared with workers in most other private sector industries. The incidence rate of recordable nonfatal occupational injuries and illnesses was 6.4 cases per 100 fulltime workers in private sector hospitals for 2013, almost twice the rate of 3.3 cases per 100 full-time workers in all private sector occupations (Bureau of Labor Statistics, 2014). Respiratory conditions are a leading cause of work-related illness among HCW. The incident rate among general medical and surgical hospital staff, for example, is 5.3 cases per 10,000 full-time workers in 2012 (Bureau of Labor Statistics, 2013). The Occupational Safety and Health Administration (OSHA) identified respiratory protection standards as the fourth most frequently cited violation during OSHA inspections of worksites in fiscal year 2014 (OSHA, n.d.-b). Injuries and illnesses among HCW also have consequences for patient health and safety (Lundstrom, Pugliese, Bartley, Cox, & Guither, 2002).

Organizations develop cultures that demonstrate varying levels of commitment to workers' overall well-being. One aspect of organizational culture is "safety culture" (i.e., the shared values, assumptions, and practices related to health and safety) which is reflected in organizational policies, procedures, structures, and systems as well as safety behavior (European Agency for Safety and Health at Work [EU-OSHA], 2011). A component of safety culture is "safety climate" (i.e., the collective perception of workers about safety in their work environments [EU-OSHA, 2011; Guldenmund, 2010; A. P. Smith & Wadsworth, 2009]).

Workers who perceive a strong safety climate are more likely to practice safe workplace behaviors (Rozenbojm, Nichol, Spielmann, & Holness, 2015). Safety climate is positively associated with both self-reported (Cigularov, Chen, & Rosecrance, 2010; Hahn & Murphy, 2008; Morrow et al., 2010; Neal, Griffin, & Hart, 2000; Pousette, Larsson, & Törner, 2008; Seo, Torabi, Blair, & Ellis, 2004) and observer-measured (Johnson, 2007) safe work practices. Safety climate is positively correlated with HCPs' compliance with Centers for Disease Control and Prevention (CDC) guidelines for use of personal protective equipment (PPE; e.g., goggles, gloves, gowns) when dealing with potentially infectious body fluids (Anderson, McGovern, Kochevar, Vesley, & Gershon, 2000; Gershon et al., 2000). A supportive safety climate has also been found to promote safety knowledge and motivation (Neal et al., 2000), reduce perceived barriers to safe work practices (DeJoy, Murphy, & Gershon, 1995), and improve workers' perceptions of workplace safety (DeJoy, Della, Vandenberg, & Wilson, 2010; DeJoy, Schaffer, Wilson, Vandenberg, & Butts, 2004; Huang, Chen, DeArmond, Cigularov, & Chen, 2007; Turnberg & Daniell, 2008), especially in settings where workers are at the greatest risk for illness or injury (Huang et al., 2007). Safety climate also contributes to workers' perceptions that they have control over their own safety, which in turn reduces injuries (Huang, Ho, Smith, & Chen, 2006).

Previous research has suggested that safety climate either directly or indirectly predicts several work-related health outcomes. Work-related accidents and injuries are less common and less severe in workplaces with a positive safety climate (Cigularov et al., 2010; DeJoy et al., 2010; Huang et al., 2006; Johnson, 2007; Seo et al., 2004). Workers wait less time before reporting incidents and submit fewer lost time injury claims when they perceive their organization's safety climate is strong (Hooper & Charney, 2005). In hospitals, a supportive

safety climate is related to fewer exposures to blood and bodily fluids (Gershon et al., 2007), musculoskeletal injuries (Daraiseh et al., 2003; Hofmann & Mark, 2006; Mark et al., 2007), and needlestick injuries (Clarke, 2007; Clarke, Rockett, Sloane, & Aiken, 2002; Clarke, Sloane, & Aiken, 2002; Hooper & Charney, 2005; D. R. Smith et al., 2010). Clarke, Rockett, et al. (2002) found that safety climate was an even stronger predictor of needlestick injuries than the adoption of needles designed to reduce sharps injuries.

Zohar (2010) argued that workers in various organizational positions were likely to have different perceptions of safety climate because of their unique experiences. Although the evidence is scant, some research suggests that safety climate can vary systematically among workers at the same workplace. Luria and Yagil (2010) found differences between temporary and permanent workers' safety climate perceptions. Beus, Bergman, and Payne (2010) reported a positive correlation between job tenure and safety climate perceptions; Rozenbojm et al. (2015) suggested job tenure is related to safety behavior. Zohar and Luria (2005) found within- and between-group variance in safety climate perceptions related to supervisory discretion in implementing safety procedures. As they and others have noted, within-organizational differences in safety climate perceptions could reveal a source of dissonance in an organization's safety culture that has consequences for workers' health and safety outcomes (Coyle, Sleeman, & Adams, 1995; Zohar & Luria, 2005).

Although validated scales have emerged in recent years (e.g., the Nordic Occupational Safety Climate Questionnaire [NOSACQ-50]; National Research Centre for the Working Environment (Denmark), 2012), specific measures of safety climate vary considerably across studies in this evolving field of inquiry. Nevertheless, researchers generally agree on several key dimensions of safety climate. Managerial commitment to worker safety is almost universally accepted as the most significant predictor of a strong safety climate (DeJoy et al., 2010). Other key dimensions emphasized in existing research include the implementation of and management feedback in regard to safety rules and procedures, coworkers' safety norms, worker involvement in safety processes, and resources for ensuring safety (e.g., safety officers or committees), the availability of PPE, and training opportunities (Flin, Mearns, O'Connor, & Bryden, 2000; Hahn & Murphy, 2008; Seo et al., 2004).

The purpose of this study was to explore differences in safety climate perceptions among HCPs in acute care hospitals in the United States based on employees' roles at the hospital (i.e., managerial or provider). The primary research question was,

Research Question: Do perceptions of safety climate vary by type of HCP?

The authors examined differences among hospital manager (HM), unit manager (UM) and health care worker (HCW) responses to a set of 10 survey questions designed to answer the research question. The findings are based on data collected in 2011 and 2012 for the Respirator Use Evaluation in Acute Care Hospitals (REACH II) study. The primary purpose of REACH II was to understand how well acute care hospitals in the United States were implementing OSHA's published respiratory protection program (RPP) requirements and CDC's infection control guidance (Peterson, Novak, Stradtman, Wilson, & Couzens, 2015).

Method

The REACH II evaluation included in-person interviews with three categories of hospital personnel: HMs, Ums, and HCWs. The surveys were conducted in California, Illinois, Michigan, Minnesota, New York, and North Carolina. All research activities were approved by appropriate state, university, and/or federal institutional review boards.

Measures

Safety climate was assessed using 10 agree/disagree questionnaire items derived from Gershon et al. (2000) and Turnberg (2006). A subset of items from those studies was selected and then modified by the research team to focus on respiratory protection. The 10 safety climate questions for the REACH II study represented five of the dimensions of safety climate common in the literature: managerial commitment to (or support for) safety, management feedback on safety procedures, coworkers' safety norms, worker involvement, and worker training. Each dimension was measured by two to three questionnaire items. As a whole, these safety climate questions did not comprise a validated scale, but other researchers have found similar safety climate questions and themes to be valid and reliable measures (e.g., Hahn & Murphy, 2008; Turnberg & Daniell, 2008).

Control variables used for the analysis came from the REACH II questionnaires and publicly available records. The questionnaires captured information on the respondent's job tenure and level of education. Hospital location and size (i.e., number of licensed beds) were derived from publicly available records.

Data Collection Procedures

Research teams recruited hospitals of various sizes, from areas of disparate population densities (i.e., rural or urban), and of three ownership types (i.e., for-profit, non-profit, not-for-profit). However, final hospital samples varied considerably across participating states, with hospitals in some states concentrated in particular cities or regions; those in other states were dispersed throughout the state. Within each hospital, study teams recruited HMs by targeting those employees responsible for overseeing RPPs. UMs were chosen to represent a wide range of hospital units and job titles with varying levels of respiratory risk. The recruitment of HCWs focused on direct patient care staff most likely to need respiratory protection. Participants were generally not compensated, although HCWs in one state were offered lunch or snacks. Further details of recruitment procedures are provided in Peterson et al. (2015). Trained study staff conducted the HCP interviews in person, generally in private areas of the hospital. Interviews lasted approximately 20 minutes. The study teams in two states allowed some participants to complete the questionnaire and mail it back to the research staff.

Data Analysis

Data analysis consisted of both descriptive and inferential statistics. Descriptive analyses show the proportions of HMs, Ums, and HCWs who agreed, disagreed, or reported they did not know when asked about the various aspects of safety climate.

Multivariate models were also constructed for each of the five dimensions of safety climate to assess whether differences in HCP's perceptions of safety climate elements were statistically meaningful or could be accounted for using other HCP- or hospital-level characteristics. The variables modelled include HCP type (HCW, HM, UM), hospital state (California, Illinois, Michigan, Minnesota, North Carolina, New York), hospital size (<150 beds, 150–300 beds, >300 beds), respondent job tenure (<1 year, 1 year, 2–4 years, 5+ years), and respondent education level (associate degree, 4-year college degree, graduate degree, other, missing/unknown). The models also controlled for each respondent's hospital because responses could be considered repeated measures from each hospital. Statistical significance testing and the standard significance threshold ($p \leq .05$) were used.

Finally, pairwise comparisons were made between each possible set of HCPs, namely, HM versus UM, HM versus HCW, and UM versus HCW, to determine which types of HCPs differed statistically from the others in their safety climate perceptions after controlling for covariates (i.e., hospital, state, hospital size, job tenure, and education). All analyses were generated using SAS version 9.3 (SAS Institute Inc., Cary, NC).

Results

A total of 98 acute care hospitals participated in the REACH II surveys. Overall, 33.7% of the REACH II hospitals were small facilities (i.e., <150 beds), 26.5% were medium-sized (i.e., 150–300 beds), and 39.8% were large facilities (i.e., >300 beds; Table 1). At each hospital, an average of 2.2 HMs, 2.5 UMs, and 11.3 HCWs completed the survey. More than two fifths (40%) of each type of HCP reported a job tenure of more than 5 years. HMs and UMs tended to have higher levels of education than HCWs (Table 2). In the following sections, the authors compare HM, UM, and HCW perceptions for the five dimensions of safety climate.

Management Commitment to Safety

Do perceptions of management commitment to safety vary by HCP type? Two questionnaire items assessed this dimension of safety climate: "The health and safety of workers is a high priority with management where I work" and "Management communicates information about safety and health on a regular basis." For both questions, 90% or more of all three types of HCPs agreed with these statements (Table 3).

In the multivariate models, HCP type was a statistically significant predictor of both questions of managerial commitment to safety ($p \leq .05$), controlling for the effects of state, hospital size, job tenure, and education, and accounting for the respondent's hospital (Table 4). For the first question (i.e., managerial prioritization of worker health and safety), hospital size was also significant. For the second question (i.e., management communication), state was also significant, but hospital size was not. Job tenure and education were not significant in either model.

For both managerial commitment questions, the pairwise comparisons were significant between HCWs and HMs and between HCWs and UMs ($p \leq .05$; Table 5). HCWs were significantly less likely than either HMs or UMs to agree and more likely to say they

disagreed or did not know whether management viewed health and safety as a high priority. HCWs were also less likely than either HMs or UMs to say that management communicated information about safety and health on a regular basis (Table 3). The pairwise comparisons between HMs and UMs were not significant for either item.

Management Feedback on Safety Procedures

Do perceptions of management feedback on safety procedures vary by HCP type? Two safety climate items assessed perceptions of managers' feedback on safety procedures and rules: "Supervisors correct workers if they do not wear a respirator when required" and "Supervisors correct workers if they do not wear a respirator properly." More than 19% of HMs and more than 15% of HCWs said they did not know whether supervisors enforced the use of respirators when required (Table 3). Most UMs (93.1%), in contrast, agreed that supervisors enforced the use of respirators when required. Similarly, 27% of HMs and 21% of HCWs said they did not know whether supervisors corrected workers when they did not wear respirators properly. A majority of UMs (86.5%) agreed supervisors enforced wearing respirators properly.

In the multivariate models, HCP type was a statistically significant predictor of the answers to both questions about management feedback ($p \leq .05$; Table 4). For the first question (i.e., wearing respirators when required), state, job tenure, and education were all significant predictors. For the second question (i.e., wearing respirators properly), state and education were significant predictors.

For both questions about management feedback, pairwise comparisons were significantly different between HMs and UMs and between HCWs and UMs ($p \leq .05$; Table 5). UMs were significantly more likely than HMs or HCWs to respond that supervisors correct workers who fail to wear respirators when required and wear respirators improperly (Table 3). The pairwise comparisons between HMs and HCWs were not significant for either question about management feedback.

Coworkers' Safety Norms

Do perceptions of coworkers' safety norms vary by HCP type? One question was included in the REACH II surveys that assessed coworker safety norms: "Workers at my workplace use respirators when they are required." Almost all respondents in all three HCP types agreed that their coworkers used respirators when required (93% of HMs, 95.5% of UMs, and 89.2% of HCWs; Table 3).

In the multivariate model, HCP type was the only statistically significant predictor of safety norms ($p \leq .05$; Table 4). In the pairwise comparisons, HCWs responses differed significantly from UMs ($p \leq .05$; Table 5). HCWs were significantly less likely than UMs to agree and more likely to disagree or respond "did not know" if workers wear respirators when required (Table 3). The pairwise comparisons between HMs and HCWs and between HMs and UMs were not significantly different.

Worker Involvement in Health and Safety Issues

Do perceptions of worker involvement in health and safety issues vary by HCP type? Worker involvement in health and safety was measured by two questionnaire items: “Management seeks feedback from workers about health and safety issues” and “Are you formally asked to provide input on respiratory protection policy decisions?/Is your input formally solicited during program evaluation?” The phrasing of the latter question depended on the HCP type responding to the survey. Almost all HMs and UMs (93% and 91.8%, respectively) agreed that management sought feedback from workers; only 80.8% of HCWs agreed (Table 3). Most HCWs (67.4%) disagreed that their input was sought during program evaluation, which was the least positive perception assessed across the five safety climate dimensions. This finding compared with 13.1% of HMs and 28.3% of UMs.

In the multivariate model, HCP type and state were statistically significant predictors of both questions about the worker involvement dimension ($p \leq .05$; Table 4). In addition, hospital size was significant in the first worker involvement model (i.e., management seeks feedback). Job tenure was significant in the second model (i.e., input formally solicited).

In the pairwise comparisons, significant differences were found between HCWs and both HMs and UMs for both questions (Table 5). HCWs were significantly less likely than either HMs or UMs to agree and more likely to disagree with or not know about both items ($p \leq .05$ for all four comparisons; Table 3). HMs were also significantly more likely than UMs to agree that they were asked to provide input on respiratory protection policy decisions ($p \leq .05$).

Worker Training

Do perceptions of worker training vary by HCP type? Three items were used to assess the worker training dimension of safety climate: “Workers are provided with training about proper use of respiratory protection,” “Does your facility offer you training in how to properly use respiratory protection?” and “Do employees receive training about when to wear respiratory protection?” Almost all HCPs agreed or said yes to all three of these items (Table 3).

In the multivariate models, HCP type was a statistically significant predictor of all three questions related to the worker training dimension of safety climate ($p \leq .05$; Table 4). State was also significant for all three questions. Education was significant for the third question (i.e., training about when to wear respiratory protection).

In the pairwise comparisons, HCWs differed significantly from both HMs and UMs on all three questionnaire items (Table 5). HCWs were less likely than HMs or UMs to report that training was provided on the proper use of respiratory protection and on how and when to use respiratory protection (Table 3). Differences between HMs and UMs were not significant for any of the three questions about worker safety training.

Discussion

This study found, based on REACH II survey data, significant differences among HCP in their safety climate perceptions related to respiratory protection in their acute care hospitals. HCWs often perceived a less effective safety climate than HMs and UMs.

The REACH II data support previous findings on the variability of safety climate perceptions across groups of workers at the same workplace (Beus et al., 2010; Luria & Yagil, 2010; Zohar, 2010; Zohar & Luria, 2005). HCWs' perceptions differed significantly from the perceptions of UMs and HMs for seven of the 10 safety climate questions. HCWs had less positive views on management commitment to safety, worker involvement in health and safety (including involvement in respiratory protection policy decisions), and worker safety training dimensions of safety climate. This pattern applied to each of the questions that measured those three safety climate dimensions. The most disparate perceptions concerned whether worker input on respiratory protection policy decisions was formally requested. For this worker involvement question, HCWs had the least positive perceptions, HMs had the most positive, and UMs were in-between.

The primary exception to this pattern was management feedback on safety procedures. For this dimension of safety climate, UMs perceptions were distinctly more positive than either HMs or HCWs, perhaps because UMs were more likely to be responsible for providing that feedback. UMs also had significantly more positive perceptions than HCWs regarding coworker safety norms. HCWs had the least positive perceptions of coworker norms among the three HCP types.

This analysis also found that safety climate perceptions were often correlated with the state in which the hospital was located. This finding was consistent with findings from an assessment of HCP adherence to respiratory guidelines, also based on REACH II data, which found that adherence, particularly HCW's adherence, was often correlated with state (Peterson, Hampton, Couzens, & Wilson, 2013). State was a predictor for one question in the managerial commitment to safety dimension of safety climate (i.e., management communication), both questions of the managers' feedback dimension, both questions of the worker involvement dimension, and all three questions about the worker training dimension. This geographic factor may be a proxy for the hospitals' political, budgetary, and/or policy context, but more study is needed to clarify the relationship.

Another predictive factor that emerged from this analysis was hospital size, which was a significant predictor for one management commitment to safety model (i.e., management priorities) and one worker involvement model (i.e., management seeks feedback). The authors suspect that managements' capacity to communicate priorities and solicit feedback may be greater in larger hospitals.

The respondent's education and job tenure were also predictive of some safety climate perceptions. Education was significant for both management feedback questions and for one worker training question (i.e., training about when to wear respiratory protection). Job tenure was significant for one management feedback model (i.e., wearing respirators when

required) and one worker involvement model (i.e., input formally solicited). This finding is consistent with the reports by Luria and Yagil (2010) and Beus et al. (2010).

Existing studies offer limited guidance on why safety climate might be perceived differently across groups of workers at the same workplace. Zohar (2010) argued that varied perceptions within an organization are driven by workers' experiences with competing organizational demands, gaps between policy and practice, and internal inconsistencies across organizational levels. This hypothesis suggests that safety climate may also change over time. These data indicate that although HCWs rarely question managerial commitment to safety, they do not necessarily perceive that they have received adequate feedback on respirator use from their supervisors. This finding suggests that UMs could strengthen communication about when and how to use respirators, and raises questions about UMs' reasons for not providing sufficient feedback. UMs may be constrained by lack of time, competing demands, interpersonal dynamics, or something else. Hospitals may also be able to strengthen their safety climate by creating formal opportunities for workers to provide feedback to hospital management about safety operations and management could provide feedback to HCWs at the point of care. Further research is needed to identify how and why these diverse safety climate perceptions are formed.

Limitations

The primary limitations of this research have been discussed in depth elsewhere (Peterson et al., 2015), but include the nature of the survey samples, which were convenience samples, and the data collection procedures, which may have introduced survey mode effects. As a result, these findings should be considered exploratory in nature and should not be generalized beyond the 98 hospitals that participated in the REACH II study.

Another, potentially more significant limitation concerns the questions used to assess safety climate. Although the items captured the same themes of the validated indicators used in other studies, the 10 REACH II questions do not constitute a reliable or valid safety climate scale. Of particular note, all 10 questions are framed in positive terms, which may account for the highly positive ratings UMs gave supervisors' (i.e., their own) feedback to HCWs on proper respiratory protection as well as both HMs' and UMs' more positive perceptions of management's commitment to safety. To avoid such social desirability bias, future studies should incorporate a mix of positive and negative wording in survey items. In addition, a large proportion of respondents answered "don't know" to several questions (Table 3), which did not lend itself to clear interpretation. Adding an additional question that asks respondents to clarify this response could provide needed information. Another approach would be to eliminate this response category or use a different set of responses in future surveys on this topic.

Finally, this study did not include data on the shift the respondents worked. It is possible that workers on the overnight shift receive less supervisory guidance and oversight than those on other shifts. Future studies could explore this possibility. Future studies should also explore the role of perceived risk regarding workers' health and safety behaviors and perceptions.

Implications for Practice

The hospital environment contains numerous hazards (e.g., bacteria, viruses, and chemicals) that may be inhaled by hospital staff and cause injury or illness. The hazards associated with aerosol transmissible diseases (e.g., infectious patients with a transmissible disease like measles) cannot be routinely measured, eliminated from or substituted out of the hospital setting. The hospital organization must have in place a variety of control strategies to eliminate or minimize risk to hazards faced by employees in this work environment. This goal requires eliminating or isolating hazards and/or using specialized ventilation (e.g., isolation rooms or laboratory hoods), implementing administrative controls (i.e., minimizing the extent or duration of exposures or reducing the number of employees exposed) and effective work practices (e.g., providing vaccinations and training; monitoring hand and respiratory hygiene), and providing respirators and other PPE to reduce risk. Each facility should not only develop policies and procedures which address these prevention and control methods used at their institution but also support a safety climate that effectively engages all staff in occupational health protection.

As previous scholars have noted, significant differences in perceptions of safety climate across groups of workers such as those reported here suggest weaknesses in organizations' overall safety culture (Zohar, 2010; Zohar & Luria, 2005). Highlighting these differences provides practitioners the opportunity to explore otherwise hidden sources of conflict, initiate consensus-building, and ultimately reduce workplace illness and injury (Coyle et al., 1995; Zohar, 2010; Zohar & Luria, 2005). Occupational health and infection control professionals must strategically work with management to improve communication, especially unit-based safety oversight and daily practice related to respiratory protection that affects all HCWs. This approach entails HMs, UMs, and HCWs working together to improve safety climate and eliminate barriers to implementing and routinely monitoring effective hospital respiratory protection policies and practices.

It is notable, for example, that the safety climate dimension with the largest disparities across respondent type in the REACH II analysis is worker involvement. Hospitals are required by OSHA to have a written RPP with a formal mechanism for program evaluation that measures the effectiveness of the RPP including input from users (OSHA, n.d.-a). The perceived lack of worker input suggests a significant gap in hospitals' adherence to this OSHA requirement, adversely affecting hospital safety climate and reinforcing recent findings from OSHA investigations (OSHA, n.d.-b). It is vital that HCWs have input into all aspects of respiratory protection as outlined in the OSHA standard; however, this process must first start with HCWs better understanding aerosol transmissible diseases and why respiratory protection is essential. All HCWs must be provided information on how to access the OSHA Respiratory Protection standard; the relevant components of the standard, including the name of the program administrator; and the hospital's written RPP, which should include policies and procedures, mechanisms for hazard evaluation and respirator selection, signs and symptoms of exposure and what to do if exposed, medical evaluation and fit-testing, and storage, maintenance, and disposal of respirators. Occupational health professionals are key resources to provide the leadership necessary to ensure appropriate and required training and monitoring.

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Applying Research to Practice

Hospital managers should review their Respiratory Protection Program (RPP) to ensure it includes provisions for soliciting input about the program from HCWs and UMs, and then seek input from HCWs and UMs on the effectiveness hospital's respiratory protection program and policies. Hospitals must have a variety of control strategies to eliminate or minimize employees' hazard risks. Each facility should support a safety climate that effectively engages workers in health protection. Occupational health and infection control professionals should strategically work with management to improve communication and reinforce daily best practice related to respiratory protection.

Table 1

Hospital Size by State ($N = 98$)

	Total	Number of beds		
		<150	150–300	>301
California	15	5	6	4
Illinois	13	2	1	10
Michigan	11	6	2	3
Minnesota	15	7	5	3
New York	23	9	9	5
North Carolina	21	4	3	14
Total	98	33	26	39

Table 2

Participant Characteristics by Health Care Personnel Type

Characteristic	HMs (*n* = 215)		UMs (*n* = 245)		HCWs (*N* = 1,105)	
	n[a]	%[b]	*n*	%[b]	*n*[a]	%[b]
Job tenure						
<1 year	28	15.4	46	18.8	109	9.8
1–2 years	25	11.3	18	8.6	142	12.5
3–4 years	64	29.0	66	26.9	265	23.3
5 or more years	98	44.3	112	45.7	603	54.3
Education						
Associates degree	32	16.2	57	23.8	459	42.3
4-year degree	100	50.8	97	41.0	384	35.4
Graduate degree	72	27.4	79	32.6	81	7.5
Other	11	5.6	10	2.5	191	14.8

Note. HM = hospital manager; UM = unit manager; HCW = health care worker.

[a]Numbers do not sum to total sample size due to missing values.

[b]Excludes “missing” and “don’t know” values.

Table 3

Safety Climate Perceptions by Type of Health Care Personnel

Safety climate dimension/ questionnaire item	% agree/yes			% disagree/no			% don't know		
	HMs	UMs	HCWs	HMs	UMs	HCWs	HMs	UMs	HCWs
Managerial commitment to safety									
The health and safety of workers is a high priority with management where I work.	99.5	99.6	93.4	0.5	0.0	4.1	0.0	0.4	2.5
Management communicates information about safety and health on a regular basis.	93.0	94.3	89.6	3.3	4.1	7.0	3.7	1.6	3.4
Management feedback on safety procedures									
Supervisors correct workers if they do not wear a respirator when required.	78.1	93.1	76.8	2.8	2.0	7.8	19.1	4.9	15.4
Supervisors correct workers if they do not wear a respirator properly.[a]	66.5	86.5	68.9	6.5	2.9	10.0	27.0	10.6	21.0
Coworkers' safety norms									
Workers at my workplace use respirators when they are required.	93.0	95.5	89.2	3.3	2.0	3.6	3.7	2.5	7.3
Worker involvement									
Management seeks feedback from workers about health and safety issues.	93.0	91.8	80.8	3.7	4.9	12.8	3.3	3.3	6.5
Are you formally asked to provide input on respiratory protection policy decisions?[b]	80.8	62.7	24.3	13.1	28.3	67.4	6.1	9.0	8.4
Worker safety training									
Workers are provided with training about proper use of respiratory protection.	97.7	99.2	94.2	2.3	0.8	3.8	0.0	0.0	2.0
Does your facility offer you training in how to properly use respiratory protection?	95.3	97.6	90.3	1.4	1.2	6.9	3.3	1.2	2.8
Do employees receive training about when to wear respiratory protection?	96.2	97.6	92.1	1.4	1.2	5.7	2.4	1.2	2.2

Note. HM = hospital manager; UM = unit manager; HCW = health care worker.

[a] Numbers do not total to 100 due to rounding.

[b] In the HCW survey, this question is phrased: "Is your input formally solicited during program evaluation?"

Table 4

Predictors of Safety Climate Perceptions (*F* Values)

Safety climate dimension/ questionnaire item	Predictor				
	HCP type	State	Hospital size	Job tenure	Education
Managerial commitment to safety					
The health and safety of workers is a high priority with management where I work.	8.51*	1.02	3.68*	0.42	0.30
Management communicates information about safety and health on a regular basis.	5.19*	5.86*	2.14	0.21	1.13
Management feedback on safety procedures					
Supervisors correct workers if they do not wear respirators when required	18.83*	4.61*	1.04	2.65*	2.77*
Supervisors correct workers if they do not wear respirators properly	21.91*	7.71*	2.37	0.10	3.14*
Coworkers' safety norms					
Workers at my workplace use respirators when they are required.	6.17*	2.29	3.00	0.47	1.20
Worker involvement					
Management seeks feedback from workers about health and safety issues.	15.69*	4.16*	5.89*	0.09	1.06
Are you formally asked to provide input on respiratory protection policy decisions?[a]	165.21*	8.35*	2.91	7.20*	1.76
Worker safety training					
Workers are provided with training about proper use of respiratory protection.	7.75*	5.44*	0.46	0.83	1.00
Does your facility offer you training in how to properly use respiratory protection?	9.69*	4.21*	1.38	0.58	0.56
Do employees receive training about when to wear respiratory protection?	9.09*	10.07*	2.25	0.87	3.39*

Note. HCP = health care personnel; HCW = health care worker.

[a]In the HCW survey, this question is phrased: "Is your input formally solicited during program evaluation?"

*$p \leq .05$.

Table 5

Paired Climate Safety Comparisons Across Types of Health Care Personnel

Safety climate dimension/questionnaire item	*F* value		
	HCWs vs. HMs	HCWs vs. UMs	HMs vs. UMs
Managerial commitment to safety			
The health and safety of workers is a high priority with management where I work.	8.37*	13.22*	0.09
Management communicates information about safety and health on a regular basis.	6.52*	6.79*	0.04
Management feedback on safety procedures			
Supervisors correct workers if they do not wear a respirator when required.	2.67	37.65*	11.55*
Supervisors correct workers if they do not wear a respirator properly.	1.22	43.16*	17.66*
Coworkers' safety norms			
Workers at my workplace use respirators when they are required.	3.77	11.30*	0.87
Worker involvement			
Management seeks feedback from workers about health and safety issues.	20.95*	19.39*	0.32
Are you formally asked to provide input on respiratory protection policy decisions?[a]	257.52*	162.46*	17.01*
Worker safety training			
Workers are provided with training about proper use of respiratory protection.	6.31*	13.08*	0.38
Does your facility offer you training in how to properly use respiratory protection?	9.05*	15.50*	0.20
Do employees receive training about when to wear respiratory protection?	10.11*	13.10*	0.00

Note. GLMM, test of fixed effects, controlling for hospital, state, size of hospital, job tenure, and education. HCW = health care worker; HM = hospital manager; UM = unit manager; GLMM = generalized linear mixed models.

[a] In the HCW survey, this question is phrased: "Is your input formally solicited during program evaluation?"

* $p \leq .05$.