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Impact of Training on Work-Related Assault

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Abstract: Although training is often recommended as a part of a comprehensive approach to address occupational violence, little empirical literature exists to support this recommendation. Over 40% of nurses responding to the Minnesota Nurses Study reported being trained about occupational violence, involving seven different training topics. Although at the univariate level, an increased risk was identified for nurses trained in managing assaultive/violent patients, no statistically significant results remained at the multivariate level. This lack of protection from training is consistent with previous research, although the explanations for this lack of effect remain unclear. Additional research is necessary to obtain more specific details on occupational violence training, including training content and methods, to understand more thoroughly the impact of training on occupational violence.
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Occupational violence is the third major cause of occupational fatality overall and the second major cause for women. More than 600 homicides occurred in 2003 alone (U.S. Department of Labor, Bureau of Labor Statistics, 2004), and it is estimated that approximately 1.7 million non-fatal acts of violence occurred at work annually between 1993 and 1999 (Duhart, 2001). Employees in some occupations, including nurses, appear to be at increased risk of violence (Baxter, Hafner, & Holme, 1992; S.S. Lee, Gerberich, Waller, Anderson, & McGovern, 1999; U.S. Department

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of Health and Human Services, 1996). Results from a survey of registered nurses (RNs) conducted by the American Nurses Association (2001) revealed that health and safety concerns played a major role in nurses' decisions about leaving the profession; 25% of the nurses surveyed reported a fear of sustaining work-related assault. Estimates of the prevalence of violence vary with each study because the primarily descriptive study designs frequently focus on a particular facility, unit, or subgroup of nurses. In addition, definitions of work-related violence vary among these studies, further complicating the interpretation of findings. Estimates range from 57% of staff assaulted per year (Fernandes et al., 1999) to as high as 87% of staff being assaulted five times per year (ENA Survey Examines, 1995).

In 1996, the Occupational Safety and Health Administration (OSHA, 1996) published "Guidelines for Preventing Workplace Violence for Health Care and Social Service Workers," which included recommended training topics such as: the workplace violence prevention policy, risk factors that cause or contribute to assaults, ways to prevent or diffuse volatile situations or aggressive behavior, location and operation of safety devices, and policies and procedures for reporting and record-keeping. However, these guidelines are advisory in nature; there is no violence prevention mandate from OSHA.

Training is often recommended as essential to a comprehensive approach to work-related violence; yet little scientific evidence exists on the effectiveness of such intervention (Anderson, 2002; Liss & McCaskell, 1994; Northwestern National Life Insurance Company, 1993; Simonowitz, Rigdon, & Mannings, 1997; Trape, 1998; Warshaw & Messite, 1996; Wilkinson, 2001). It is also unclear how many workers actually receive violence prevention training, with estimates ranging between 23% of medical students (Ellwood & Rey, 1996) to 84% of assaulted health care workers (Yassi, Tate, Cooper, Jenkins, & Trottier, 1998).

Some researchers have found beneficial aspects of work-related violence prevention training, with positive outcomes ranging from lower staff injury rates among those trained in violence prevention to positive feedback from staff members involved in training (Beech, 1999; Bensley et al., 1997; Carmel & Hunter, 1990; Durkin & Wilson, 1998; Infantino & Musingo, 1985; Lanza, Kayne, Hicks, & Milner, 1991; Lehmann, Padilla, Clark, & Loucks, 1983; Martin, 1995). In contrast, other investigators have not found such benefits (Helmuth, 1994; Williams, 1996) or were unable to demonstrate important differences in assault outcomes when comparing trained and untrained staff (Baxter et al., 1992; Little, 1999). Moreover, other researchers found an increased risk of violence for nurses who attended training (S.S. Lee et al., 1999; Schaffer, Casteel, & Kraus, 2002; Walker & Seifert, 1994; Whittington, Shuttleworth, & Hill, 1996). Arnetz and Arnetz (2000) reported both positive and negative outcomes following participation in an occupational violence intervention. Positive outcomes for staff who participated in discussions following violence (intervention group) included an increased awareness of risk factors for violence, knowledge of how to avoid potentially dangerous situations, and strategies to deal with aggressive patients. However, the intervention group also reported 50% more violent incidents than a control group during the study period.

The quality of violence prevention training also appeared to vary greatly. From a study of 130 emergency department staff at two hospitals (58% response), sporadic training was documented rather than a systematic approach to aggression management (F. Lee, 2001).

Little conclusive research exists on work-related assault and assault training. Of the research reviewed, only three groups of researchers (Lanza et al., 1991; S.S. Lee et al., 1999; Schaffer et al., 2002) used a case-control approach to compare exposures between assaulted and non-assaulted workers, and only one researcher (Ore, 2002) used a post test-control approach to compare violence outcomes between trained and non-trained workers. The other studies were primarily descriptive, with little, if any, control of other exposures. In five studies (Arnetz & Arnetz, 2000; Durkin & Wilson, 1998; Lanza et al., 1991; Martin, 1995; Yassi et al., 1998), some prospective measurements were included. Training was not the primary focus of most of these studies but, rather, only one of several potential risk factors examined.

It is, therefore, important to evaluate whether the resources (e.g., time, effort, expense) expended on violence prevention training are efficacious. The purpose of this study was to examine the impact of violence prevention training on work-related physical assault.

METHODS

This study was based on case-control data collected for the Risk Factors for Violence Among Nurses (RFVAN) study (Gerberich et al., 2002), which was designed to identify the magnitude of

and specific risk factors for work-related violence. Further details regarding study design and results have been described (Gerberich et al., 2004). Approval to conduct the study was received from the University of Minnesota Human Subjects Committee of the Institutional Review Board.

Target Population

The target population for this study consisted of Minnesota nurses licensed as of October 1, 1998. At that time, the *Nursing License List* (1998) indicated 79,128 nurses that were licensed in the state (57,388 RNs; 21,740 licensed practical nurses [LPNs]).

Data Collection

The RFVAN study consisted of two phases: a comprehensive study (Phase 1) and a nested case-control study (Phase 2). Power calculations based on the methods, described by Schlesselman (1982), guided sample size calculation. Assuming a conservative response rate of 70%, alpha of .05 (two-sided), power of .80, estimated 500 cases, 3 controls per case, and a physical violence rate of at least 10%, we estimated that a sample of 6,300 would be sufficient. Simple random sampling of the *Nursing License List* was used to select 220 nurses for a pilot study, followed by a sample of 6,300 nurses for Phase 1. At the time the sample was drawn, 73% of nurses in Minnesota were RNs, and 27% were Licensed LPNs. Of the nurses responding to Phase 1, 75% were RNs, 25% were LPNs; in Phase 2, 73% were RNs, 27% were LPNs.

The 12-page Phase 1 survey was used to identify nurses who had worked in Minnesota in the past year and, among them, those who reported work-related violence during that time. In addition, nurses were asked specifically about the facility and department in which they worked most often, demographic data, and detailed information regarding work-related physical and non-physical violent events. Most questions included a variety of response options (check one, check all that apply, or yes/no/unsure). In addition, several questions were open-ended to allow additional responses. The definitions of *work-related*, *work-related violence*, *physical assault*, *threat*, *sexual harassment*, and *verbal abuse* were included prior to the pertinent questions. Participants were encouraged to call the research office with any questions, and the cover letter and survey instrument included a toll-free telephone number. Because no adequate survey tool existed at the time of this study, questions were developed based on current literature and investigator expertise. In this study, 6,300 nurses were randomly sampled; however, batch sizes of 500 initial surveys per week were sent to allow for the time needed for follow-up mailings and to process requests for corrections on incomplete or missing data in a timely manner. The Phase 1 study period lasted from August 1998 through March 2000 to accommodate these extensive mailings; however, each participant reported only on the 12-month period prior to the date on which the survey instrument was completed.

A nested case-control design was utilized in Phase 2 to examine the relationship between exposures and work-related physical assault. The case-control survey was used to obtain data on various factors, including personal exposures (e.g., patient contact hours), environmental exposures (e.g., work-related violence prevention training, type of department), and characteristics of others in the environment (e.g., patient demographics). The survey format was similar to that of the comprehensive survey: it was eight pages long and included open-ended and fixed response questions. Study instruments are available on the University of Minnesota, Center for Violence Prevention and Control, Environmental Health Sciences website: www.umn.edu/cvpc/research.html.

Case and control participants were identified from those responding to Phase 1. Case participants ($n = 475$)—defined as those nurses who reported being physically assaulted while working as nurses at least once during the previous 12 months—were surveyed about their exposures for the time of the assault and the month prior to the assault. Unmatched control participants ($n = 1{,}425$) were selected at a 3:1 ratio and were randomly selected from all nurses who worked during the study period. Control participants were surveyed about their exposures for a random 1-month period within the study period. For each study phase, as many as four follow-up mailings were implemented to optimize the response rate. Data relevant to the training variables from the case-control study were the primary focus of the current analysis.

Measures

Dependent variable

Work-related physical assault. Work-related violence was defined as the intentional use of

physical force or emotional abuse, against an employee, that resulted in physical or emotional injury and consequences. Physical assault was defined as being slapped, kicked, pushed, choked, grabbed, sexually assaulted, or otherwise subjected to physical contact intended to injure or harm.

Independent variable

Training. Nurses were asked to provide the most recent year of violence prevention training, if ever trained. Frequency and duration of training in the past year were assessed, including number of times trained (using a 6-point scale, ranging from *never* to *12 or more times*) and number of hours spent in training (using a 7-point scale, ranging from *none* to *25 hours or more*). In addition, nurses were asked about ever being trained about the following topics: work-related violence prevention policies, how to operate safety alarms or other safety devices, reporting work-related harassment, reporting work-related physical assault, managing assaultive or violent patients, risk factors for violence, and self-defense. Specific definitions of what would constitute training on each of these topics were left up to the respondents. Response options for each training topic included: *no*, *yes at current job*, *yes at previous job*, *yes at nursing school*, *yes at another location*, and *unsure*. Nurses were instructed to check all responses that applied.

Potential confounders. Potential confounders were grouped into three categories: environment (workplace, department/unit/area, environmental protection, administration attitude, and training policy); agent/source (patient characteristics); and host (work activity and nurse characteristics). Specific definitions of these variables, along with assumptions on the relation between the potential confounder and training, follow.

Administration attitude. Nurses were asked for their perceptions of the extent to which administration expected assault to be a consequence of the nurse's job and to what extent administrators took corrective/preventive measures against assault in the workplace. Response options ranged from *strongly disagree* to *strongly agree* (4-point scale), and also included a response to indicate if the nurse had *no supervisor* or was *unsure*. We anticipated that an administration attitude that more proactively addressed work-related violence would be more likely to provide training which, in turn, would be a protective measure against work-related violence (Cole, Grubb, Sauter, Swanson, & Lawless, 1997).

Department/unit/area. During a specific month, the nurse was asked ''In what type of department/unit/area did you work the most time?'' We expected that some departments, such as emergency or psychiatric departments, may place persons at more risk for violent events and would, thus, be more likely to provide training (Barlow & Rizzo, 1997; Yassi, 1994).

Environmental protection. Environmental protection included assault deterrents, such as security alarms, controlled access (response options included *yes*, *no*, and *unsure*), lighting level (four response options ranged from *bright as daylight* to *could not see anything*), accessibility of exits (response options were *yes*, *no*, and *unsure*), and physical barriers (response options were *yes*, *no*, and *unsure*). We assumed that if a work environment contained specific environmental protections, nurses would need specific training, or be more likely to be trained to prevent work-related violence because the environment was considered high risk (S.S. Lee et al., 1999).

Nurse characteristics. Nurse characteristics included age, sex, race, nursing education (based on a 5-point scale ranging from diploma to doctorate), length of time spent working in a specific department, and length of time spent working as a nurse. We assumed that specific characteristics would influence a nurse's perception of risk, and that those with increased risk perception would be more likely to obtain training (Baxter et al., 1992; Peek-Asa, Howard, Vargas, & Kraus, 1997; Toscano, 1996).

Training policy. Nurses were asked if there was a written policy at their work facilities that required violence prevention training of staff members. Response options included: *yes*, *no*, and *unsure*. We expected that if a policy on training existed, nurses would more likely be trained.

Types of patients. Patient variables included age, race, sex, nurse's perception of patient impairment status, and average length of patient stay (based on a 7-point scale ranging from *less than 1 day* to *1 month or more*). We surmised that nurses who dealt with high-risk patients, such as those who were impaired, would be more likely to be trained (Cooper & Mendonca, 1989; Drummond, Sparr, & Gordon, 1989).

Work activity. Work activity was defined as the primary professional activity during a specific month. We anticipated that some activities, such as direct patient care, would involve more risk than others and that those with higher risk would be more likely to be trained.

Workplace. Workplace was defined by the type of facility, ownership, location, and number of beds within the facility. We surmised that, similar to high-risk departments, some workplaces, such

as psychiatric facilities, would be at higher risk for violence and, thus, more likely to provide training.

Data Analysis

The model included in Figure 1 guided the analyses for this portion of the study. A more comprehensive diagram, representing proposed causal relationships and, subsequently, the basis for a directed acyclic graph (Greenland, Pearl, & Robins, 1999), was used first to define variables to be included in the data collection instruments, and, second, to serve as a basis for analyses, to select confounders for multiple logistic regression, and to interpret results. The full causal model is found at the following website: www.umn.edu/cvpc/research.html. This model elaborates on policy and training variables; an additional model covers several other variables pertinent to work-related physical assault. Figure 1 illustrates that the environment (workplace, department/unit/area, environmental protection, administration attitude, and training policy), agent/source (types of patients), and the host (nurse characteristics and work activity) are potential confounders, and influence both training and the occurrence of work-related physical assault.

Univariate analyses were performed, first, to describe the characteristics of individual exposures (Model 1). Based on the comprehensive causal model, potentially confounding variables were selected to enter the multivariate model analyses (Model 2). These included training policy, administration attitude, work activity, workplace, types of patients, nurse characteristics, department/unit/area, and environmental protection. Multiple logistic regression (Hosmer & Lemeshow, 2000) was used to investigate the relation between specific exposures and the occurrence of work-related violence.

Certain characteristics were available from the license database for all nurses, including age, sex, home location (metro vs. non-metro), and license type (registered nurse versus licensed practical nurse). Potential response bias was controlled by estimating a weighting factor for non-response, based on responders who shared similar license database characteristics (Horvitz & Thompson, 1952; Mongin, 2001). In addition, potential response selection bias among control participants was addressed by adjusting weights by the inverse probability of selection. To represent variability from all sources, including the response weights, confidence intervals for regression coefficients were calculated by using the bias-corrected and accelerated (BCA) bootstrap method (Efron & Tibshirani, 1993). This method incorporates jackknife-type resampling to generate quantiles that can be used to identify 95% confidence limits from a percentile bootstrap distribution. Model 3 includes all potential confounders from Model 2 and, in addition, includes adjustments for non-response and non-selection of control participants.

Sensitivity analyses. Two types of sensitivity analyses were conducted to assess the magnitude and direction of potential bias. The first set of analyses focused on an uncontrolled confounder. We hypothesized that an unmeasured confounder existed that greatly increased the odds that a nurse

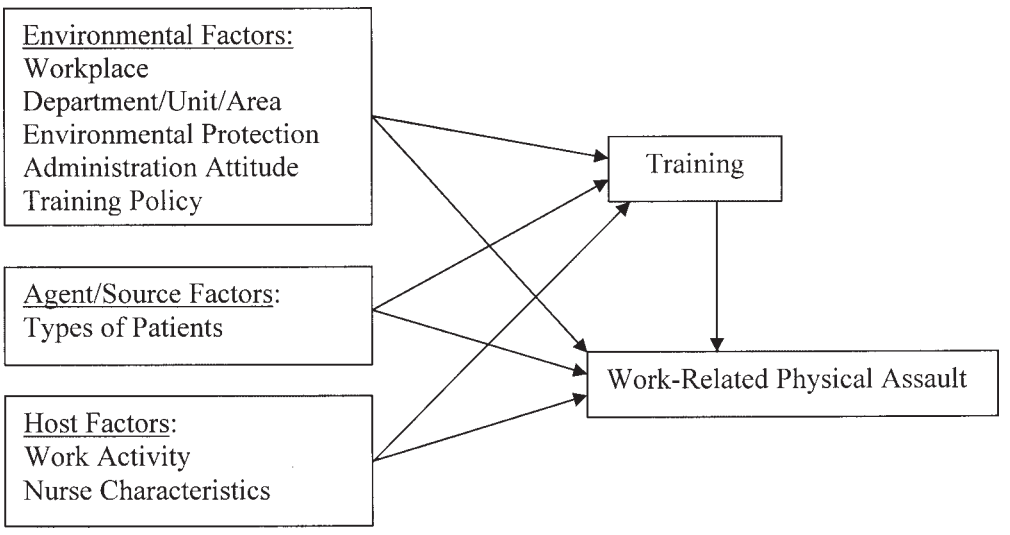

FIGURE 1. Work-related assault training.

would be assaulted (by factors of 5, 10, and 15). Using the methods described by Rothman and Greenland (1998), analyses were conducted in which the prevalence of the unmeasured confounder in the group of nurses with violence prevention training about managing assaultive or violent patients was equal to, less than, or greater than the prevalence of the confounder in the group of nurses without such training. These procedures resulted in a range of possible estimates of the odds of violence, after adjusting for the unmeasured confounder.

The second set of sensitivity analyses focused on exposure misclassification, again with training as the exposure, and work-related physical assault as the outcome. Nurses self-reported training, making it necessary to assess the degree to which the risk estimates varied, based on errors in reporting. Sensitivity was defined as the probability that someone exposed (trained) was classified as exposed; specificity was the probability that someone unexposed (not trained) was classified as unexposed. These procedures also resulted in an estimated range of the odds of violence, after adjusting for varying levels of sensitivity and specificity among case and control participants.

RESULTS

Of the 6,300 nurses randomly selected for Phase 1 of the study, 79% responded; 80% of respondents had worked in nursing positions in the previous 12 months, and of those, 13.2% indicated that they experienced work-related physical assault in the past year. Phase 2, the nested case-control study, included 1,900 nurses (overall response = 75%; response for full surveys = 67%). Because patients perpetrated nearly all of the reported physical violence (over 96%), the analyses presented here focused only on patient-perpetrated violence (case participants = 310; control participants = 946).

Characteristics of the case-control participants are presented in Table 1. These participants were predominately RNs, female, and 40–59 years of age. Most frequently, the highest nursing degree was a diploma for both case and control participants. Case participants most frequently reported working in a nursing home or a long-term care facility, while control participants most frequently worked in a hospital inpatient facility. Case participants also worked most frequently with a primarily geriatric population, while control participants worked with non-geriatric adults. The primary professional activity for both case and control participants was providing patient care. Case participants most frequently worked on long-term or assisted care units, while control participants worked on medical or surgical units.

Nurses were asked about any violence prevention training and, then, specifically about training in the past year. Over 48% of case participants and 43% of control participants reported having ever had violence prevention training, and over 39% of case participants and 35% of control participants reported being trained within the past year. The length of time, since last training, ranged from less than 1 to more than 10 years. When asked specifically about training within the past year, respondents most often reported the frequency of training as one to two times (case participants: 35%, control participants: 33%), for less than 5 hours (case participants: 32%, control participants: 29%). Among those who reported ever being trained, they most frequently identified being trained by their current employer (case participants: 82%, control participants: 79%) and/or a previous employer (case participants: 24%, control participants: 24%). A written policy requiring violence prevention training for staff was indicated by 38% of case participants and 37% of control participants. Over one-half of the nurses reported being trained about each of six of the seven topics of training assessed (Table 2), including training about reporting work-related physical assault, reporting work-related harassment, managing assaultive or violent patients, risk factors of violence, how to operate safety alarms/devices, work-related violence prevention policies, and self defense. The only important difference in frequency of reported training between case and control participants was for managing assaultive or violent patients $X^2(1,\ n = 1196) = 4.93$, $p = .03$, where case participants more frequently reported being trained. The highest percentages of training were reported in long-term care facilities, and psychiatric/behavioral or long-term/assisted care departments.

Results from univariate (Model 1) and multivariate (Models 2 and 3) regressions are presented in Table 3. Only one result had statistical significance at the .05 level: at the univariate level, managing assaultive/violent patients. Confidence intervals from all other models at the univariate and multivariate levels were not statistically significant at the .05 level.

At the univariate level, ever having training about two topics (the work-related violence policy and reporting work-related harassment) appeared protective, although not statistically significant at the .05 level. The remaining five topics of training

Table 1. Case Control Participant Characteristics

	Case ($n=310$)	Case (%)	Control ($n=946$)	Control (%)	p
Practice type[a]					.06
RN	213	68.7	701	74.1	
LPN	97	31.3	245	25.9	
Sex[b]					.20
Female	293	94.5	910	96.2	
Male	17	5.5	36	3.8	
Age[c]					.13
<30	22	7.1	54	5.7	
30 to <40	60	19.4	134	14.2	
40 to <50	121	39.0	372	39.3	
50 to <60	79	25.5	288	30.4	
60 or older	28	9.0	98	10.4	
Nursing education[d]					$<.01$
Diploma	120	38.7	361	38.2	
Associate degree	118	38.0	259	27.4	
Bachelor's degree	66	21.3	253	26.7	
Master's degree or higher	4	1.3	59	6.2	
Missing	2	.7	14	1.5	
Primary patient populations[e]					$<.01$
Geriatric	144	46.5	206	21.8	
Adult	110	35.5	416	44.0	
Split time	43	13.9	191	20.2	
Neonatal/pediatric/adolescent	13	4.2	128	13.5	
Missing (refused)	0	.0	4 (1)	.4 (.1)	
Primary professional activity[f]					$<.01$
Provided patient care	210	67.7	588	62.2	
Supervised patient care	49	15.8	72	7.6	
Other	51	16.5	285	30.1	
Missing	0	.0	1	.1	
Type of facility[g]					$<.01$
Nursing home/long term care/ rehabilitation facility	143	46.1	160	16.9	
Hospital inpatient	131	42.3	384	40.6	
Clinic/health care provider office	9	2.9	119	12.6	
Hospital outpatient/non-hospital outpatient	11	3.5	83	8.8	
Home health agency	3	1.0	65	6.9	
Public health agency	0	.0	33	3.5	
Other	13	4.2	101	10.7	
Missing	0	.0	1	.1	
Department/unit/area[h]					$<.01$
Long-term/assisted care	123	39.7	145	15.3	
Medical/surgical/OB GYN	71	22.9	267	28.2	
Psychiatric/behavioral	34	11.0	57	6.0	
Intensive care unit	27	8.7	65	6.9	
Emergency	12	3.9	24	2.5	
Family practice	8	2.6	64	6.8	
Operating Room	6	1.9	65	6.9	
Other	29	9.4	257	27.2	
Missing (refused)	0	.0	1 (1)	.1 (.1)	

Note:
[a]*Chi-square* (1, $n=1,256$) $=3.43$.
[b]*Chi-square* (1, $n=1,256$) $=1.63$.
[c]*Chi-square* (4, $n=1,256$) $=7.20$.
[d]*Chi-square* (3, $n=1,240$) $=22.91$.
[e]*Chi-square* (3, $n=1,251$) $=77.96$.
[f]*Chi-square* (2, $n=1,255$) $=33.73$.
[g]*Chi-square* (6, $n=1,255$) $=149.32$.
[h]*Chi-square* (7, $n=1,254$) $=127.32$.

Table 2. Nurses Reporting Violence Prevention Training

Topic	Case ($n=310$)	Case (%)	Control ($n=946$)	Control (%)
Training about reporting work-related physical assault	236	76.1	654	69.1
Training about reporting work-related harassment	230	74.2	702	74.2
Training about managing assaultive/violent patients*	216	69.7	577	61.0
Training about risk factors of violence	169	54.5	493	52.1
Training to operate safety alarms or other safety devices	164	52.9	501	53.0
Training about work-related violence prevention policies	162	52.3	517	54.7
Self defense	120	38.7	318	33.6

Note:
*$p=.03$

revealed increased odds of violence, with managing assaultive or violent patients and reporting work-related physical assault, although confidence intervals were not statistically significant. Based on a comprehensive causal model, the multivariate model (Model 2) was adjusted for potentially confounding factors. After adjustment for these potential confounders, the level of statistical importance for all training decreased. Model 3 shows the results after adjusting for the potential confounders and for non-response and non-selection of control participants. These additional adjustments further increased the odds ratios for those factors that were previously increased and further decreased the odds ratios for those factors that were previously decreased. However, the 95% confidence intervals also widened. Following these additional adjustments, confidence intervals for none of the training variables excluded 1, and, therefore, none was statistically significant.

Sensitivity analyses were conducted to estimate the effect of an unmeasured confounder and exposure misclassification on training about managing assaultive or violent patients. In most cases, after adjusting for a strong unmeasured confounder, training remained as a risk factor, except when the prevalence of the unmeasured confounder was at least 20% higher for those who were trained compared to those who were not trained. In these situations, the risk of violence was decreased. Similarly, when assessing the effect of exposure misclassification, training continued to appear as a risk factor in most of the estimates.

DISCUSSION

This study is unique in that it focused on the population of Minnesota nurses, rather than one department, one facility, or one subgroup of nurses. Most nurses, both cases and controls,

Table 3. Regressions for Training Type

	Model 1[a]		Model 2[b]		Model 3[c]	
	OR	95% CI	*OR*	95% CI	*OR*	95% CI
Managing assaultive or violent patients	1.380	1.038–1.835*	1.380	.898–2.119	1.551	.647–3.245
Reporting work-related physical assault	1.356	.995–1.848	1.303	.827–2.052	1.639	.629–3.507
Self defense	1.221	.935–1.595	1.384	.929–2.060	1.393	.509–2.451
Risk factors of violence	1.012	.777–1.320	1.085	.732–1.609	1.314	.531–2.400
How to operate safety alarms	1.001	.770–1.302	.820	.557–1.209	.678	.313–1.381
Reporting work-related harassment	.973	.713–1.328	.888	.571–1.380	.689	.295–1.469
Work-related violence policy	.910	.696–1.190	.691	.456–1.048	.624	.308–1.382

Note:
*indicates 95% CI excludes 1.
[a]Model 1: Univariate model.
[b]Model 2 (multivariate): Adjusted for *workplace* [type of facility (Q1), ownership of facility (Q2), location of facility (Q3), total beds at facility (Q4)], *administration attitude* [administration's expectation of violence (Q24A), administration's corrective measures against violence (Q24B)], *Department/unit/area* (Q8), *types of patients* [age of population (Q5), race of patients (Q12A), patient sex (Q12B), patient mental status (13B), average length of patient stay (Q15)], *training policy* (Q25G), *environmental protection* [assault deterrents (Q20), lighting (Q21), easily accessible exits (Q22), and physical barriers (Q23)], and *work activity* (Q6), *nurse characteristics* [age, sex, race (Q69 comprehensive), nursing education (Q43), time worked in department (Q9), time worked as nurse (Q44)].
[c]Model 3 (adjusted multivariate): Adjusted for all variables in Model 2, and non-response and non-selection.

reported receiving some training about occupational violence, with the time since training ranging from less than 1 year to more than 10 years. Of the nurses who were trained in the past year, most had one to two sessions of training, totaling less than 5 hours, which is in contrast to some studies of longer training sessions that were associated with potential benefits (Beech, 1999; Lehmann et al., 1983).

Nurses were trained about occupational violence at many locations, most frequently by their current or a previous employer. Of the other studies, where training locations were indicated, most of the training was provided by the employer (Carmel & Hunter, 1990; Helmuth, 1994; Infantino & Musingo, 1985; Lehmann et al., 1983; Martin, 1995) or through school (Beech, 1999; Ellwood & Rey, 1996).

When asked about specific training topics, the majority of nurses indicated receiving training about six of the seven training topics addressed in this study. Specific training reported by nurses varied. Most frequently, nurses were trained about reporting work-related physical assault and harassment, and managing assaultive or violent patients. Training about managing assaultive or violent patients was the most common topic among prior studies involving occupational violence training (Bensley et al., 1997; Carmel & Hunter, 1990; Lanza et al., 1991; Martin, 1995).

Training about work-related violence is frequently described as protective, although evaluation has been lacking. After adjusting for potential confounders, non-response, and non-selection of control participants, four training topics had increased odds ratios (i.e., managing assaultive patients, reporting work-related physical assault, self defense, and knowledge of the risk factors of violence), although all 95% CI included 1, and, therefore, were not statistically significant. Including time since training as an adjustment variable decreased the odds ratios, reducing those above 1 toward 1, and strengthening the protective effect of those less than 1. However, due to the excessive number of missing values, this variable was not included in the final analyses. This suggests that the protective benefit of violence prevention training may be most apparent immediately following training. A more definitive study designed to look at the time since training would be required to test this assumption.

In addition to the multivariate analyses, sensitivity analyses were conducted to assess the impact of an unmeasured confounder and exposure misclassification on the impact of training about managing violent or assaultive patients. These sensitivity analyses were also supportive of the finding that nurses, trained about managing assaultive or violent patients, had an increased risk of physical assault, except in the presence of fairly strong unmeasured confounding. Doubt about the existence of such confounding would lead to the conclusion that training does not have a large effect on reducing the chances of violence. With this study design, we do not conclude that training resulted in physical assault; rather, that after controlling for measured confounders, the relation between these two variables does not support a large preventive effect on training on physical assault.

The lack of protection from training found in this study is consistent with findings from previous studies (Arnetz & Arnetz, 2000; Helmuth, 1994; S.S. Lee et al., 1999; Ore, 2002; Schaffer et al., 2002; Walker & Seifert, 1994; Whittington et al., 1996). In a case-control study, S.S. Lee et al. (1999) found that having any assault prevention training appeared to be associated with increased risk of assault (*RR* 2.57, 95% CI: 1.34, 4.95), even after controlling for other factors. In the study by S.S. Lee et al. (1999), it was proposed that the increased risk of violence for nurses who were trained may be explained by three reasons: (a) assault prevention training may serve as a proxy for high risk workplaces, because workplaces that have a high frequency of assaults may typically provide more training; (b) incidents may be more likely to be reported at workplaces that provide training; and (c) nurses who were assaulted may be more likely than those nurses not assaulted to remember attending violence prevention training.

These reasons may also help to explain the increased risk for those trained in the current study. Incidents may be more likely to be reported and regarded as violent at workplaces that provide training. Thus, provision of training may be a proxy for a supportive work environment, or a lower threshold for recognizing violence. In an environment where violence is not tolerated, nurses may be more likely to be trained to handle potentially violent situations. This training could foster the belief that violence is not a part of the job. In environments in which no training is provided, violence may be more accepted as part of dealing with ill patients/clients. Nurses may, therefore, not consider the situations violent. Even though training has occurred, if the situation is not interpreted as violent, the techniques presented in training may not be used.

Another alternative explanation for the increased risk may be that training increased nurses' confidence in handling potentially violent situations.

Therefore, instead of taking a more passive role, or leaving the situation, the nurse may have taken a more assertive role that shifted the risk of physical assault away from less trained individuals to the nurses trained in violence prevention. This must be examined in future research.

Limitations

It was not possible in this study to account for the quality of training. With the data collection instruments used, quality could not be differentiated. The prevalence and negative impact of bad training may have outweighed any good. Data were obtained about violence prevention training, including when and where the nurse was trained, and the respective topics included in the training. However, variation occurs in specific content, method, and quality of the training (e.g., watching a video, role playing, reading an article, spending multiple days in a workshop), and the training instructor (e.g., outside expert or fellow employee). Nurses' impressions of the usefulness of the training may also vary. Despite being trained about the same topic, if some nurses receive more effective training than others, it is possible that protective effects of training may be diluted because of this unmeasured variability. Additional training details could add precision to the discussion of the impact of training. However, to date, no population-based study such as this exists; therefore, the current study provides key baseline data on violence prevention training.

Gradations of nurses' involvement with potentially violent patients were not possible in this study. An additional explanation regarding the increased risk of violence for trained nurses is that nurses who were trained were assigned higher risk patients, which may therefore increase the risk of violence.

Case participants may have provided better exposure information (differential recall), because they had an event to which exposures could be related. This may vary with control participants, who were asked to recall exposures during a particular month, without having a specific reference event. Attempts were made to minimize information bias by contacting nurses, as necessary by mail, to provide missing information and to clarify ambiguous or unclear information. In addition, sensitivity analyses were conducted to estimate the extent of bias from exposure misclassification.

As identified from the sensitivity analyses, it was possible to reverse the increased risk of violence in certain situations only if a very strong unmeasured confounder existed. For example, the assertiveness level of the nurse was not measured, although it may be assumed that a more assertive person could be more likely to be trained and also more likely to be involved in a violent situation. We are not claiming that assertiveness is a risk factor for work-related physical assault; instead, it was given as an example that might be considered an unmeasured confounder to aid in interpretation of the sensitivity analysis, as these types of analyses are still somewhat uncommon in many research areas. In this hypothetical example, the apparent increase in violence would not be caused by the training, but would be associated with it, due to the enhanced assertiveness level of the nurse as a result of the training. In this example, the nurse's assertiveness level could be considered an unmeasured confounder that increased the risk of violence by a factor of five. Sensitivity analyses indicated that if the prevalence of a high level of assertiveness among trained nurses was 50%, and among non-trained nurses was 20%, training could actually decrease the odds of violence ($OR = .83$), once the level of the nurses' assertiveness was controlled for in the analyses. However, the unmeasured confounder would need to have strong associations with both training ($OR = 4$) and violence ($OR = 5$). The sensitivity analyses provide a range of potential estimates for the odds of violence for nurses with and without training, adjusting for an unmeasured confounder. The difficulty with interpretation of these analyses is to determine which estimate, from the range of estimates generated, is the most accurate for this study population.

CONCLUSIONS

Work-related violence prevention training is often recommended as part of a comprehensive approach to address occupational violence. However, empirical literature to support this recommendation has been lacking. This study is an important first step in determining the impact of violence prevention training. Some occupational violence training topics do not appear to be protective. The explanation regarding the increased risk of assault for trained nurses most likely involves a combination of many factors, including those previously described. Additional research to obtain more training details is necessary to understand fully the impact of training on work-related physical assault. Either a study that evaluates the quality of training, or one that actually randomizes training programs may be necessary to understand

this impact. Given nurses' concerns for health and safety on the job (American Nurses Association, 2001), an urgent need exists to identify, which training modalities effectively reduce work-related violence.

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