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Original Contribution

Prospective study of violence against ED workers☆

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Abstract

Background: Health care support occupations have an assault-injury rate nearly 10 times the general sector. Emergency departments (EDs) are at greatest risk of such events.

Objective: The objective was to describe the incidence of violence in ED health care workers (HCWs) over 9 months. Specific aims were to (1) identify demographic, occupational, and perpetrator factors related to violent events (VEs) and (2) identify predictors of acute stress in victims and predictors of loss of productivity.

Methods: A longitudinal, repeated-methods design was used to collect monthly survey data from ED HCWs at 6 hospitals. Surveys assessed number and type of VEs, and feelings of safety and confidence. Victims also completed specific VE surveys. Descriptive statistics and a repeated-measure linear regression model were used.

Results: Two hundred thirteen ED HCWs completed 1795 monthly surveys and 827 VEs were reported. Average VE rate per person per 9 months was 4.15. Six hundred one events were physical threats (PTs) (3.01 per person). Two hundred twenty six events were assaults (1.13 per person). Five hundred one VE surveys were completed, describing 341 PTs and 160 assaults. Men perpetrated 63% of PTs and 52% of assaults. Significant differences in VEs were reported between registered nurses (RNs) and medical doctors (MDs) ($P = .0017$) and patient care assistants ($P < .05$). The RNs felt less safe than the MDs ($P = .0041$). The MDs felt more confident than the RNs in dealing with violent patients ($P = .013$). The RNs were more likely to experience acute stress than the MDs ($P < .001$). Acute stress reduced productivity ($P < .001$).

Conclusion: Emergency department HCWs are frequent victims of violence perpetrated by visitors and patients. This results in injuries, acute stress, and lost productivity. Acute stress has negative consequences on workers' ability to perform their duties.

1. Introduction

According to the Bureau of Labor Statistics, the most common victims of workplace assaults in 2007 were nursing aides, orderlies, and attendants, with 15.7% of all assaults by persons in any industry occurring to workers in this occupational group [1]. Health care support occupations had an injury rate due to assaults of 20.4 per 10 000 workers, and

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health care practitioners had an injury rate of 6.1 per 10 000. This compares to the general sector rate of only 2.1 per 10 000. Given that the Bureau of Labor Statistics did not include verbal or sexual harassment in their definition of violence, one cannot fully appreciate the prevalence of workplace violence (WPV) in health care. This is emphasized when one considers that such events are grossly underreported [2,3]. Even more staggering is that numerous authors, including Gerberich et al [4], have found the emergency department (ED) to be at greater risk for such events than other settings within the health care system. The prevalence of violence in the health care industry, and particularly in the ED, continues to be a pervasive problem encountered by all levels of workers from the frontline emergency medical services team to aides and technicians to nurses and physicians [4-14]. Evidence that WPV has profound negative effects on health workers continues to mount. Gates et al [15] found that WPV is a significant problem for ED nurses and has a direct relationship to experiences of negative stress, decreased work productivity, and quality of patient care.

Although recently there have been studies conducted in the United States and abroad examining the incidence of violence against health care workers, the vast majority of these studies collected data in a retrospective manner, often asking participants to recall events that occurred 6 months to 1 year prior [2,16-24]. There is a high likelihood that recall bias played a major role in these studies. The authors believe that this is the first study to examine the incidence of violent events against health care workers on a monthly basis over a 9-month period and to explore the negative consequences of such violence.

The purpose of the study was to describe the incidence of violence over a 9-month period in ED health care workers. Specific aim was to identify demographic, occupational, and perpetrator factors related to violent events, acute stress, productivity, and feelings of safety and confidence. Secondary aims were to identify the predictors of acute stress response in ED workers who were victims of violence and identify the predictors of loss of productivity by ED workers after a violent event.

2. Methods

2.1. Study design

A longitudinal, repeated-measures design was used to collect survey data from health care workers at 6 hospital EDs in 2 states. Results represent the preliminary report of the preintervention phase of a larger intervention study. Prior to beginning the study, institutional review board and hospital approvals were obtained.

2.2. Setting

Participants enrolled from 6 hospitals in 2 states. A variety of hospitals were chosen in an effort to have a representative sample of most EDs in the United States. Two of the participating hospitals were level I trauma centers, 2 were urban, non–trauma center hospitals, and 2 were suburban hospitals. Both trauma centers have separate psychiatric and adult-only EDs. Data were collected from both areas. The urban and suburban EDs provide care for all types of patients, including children and psychiatric patients. The 2 trauma centers were chosen based on author affiliation and on the fact that the 2 hospitals compared favorably with regard to volume, staffing, and patient type. The remaining hospitals were chosen based on hospital type and geographic proximity to the authors. Security was present 24 hours per day in the ED at both trauma centers. The 2 urban hospitals had 24-hour hospital security with dedicated security to the ED part-time. The 2 suburban hospitals had 24-hour hospital security with intermittent rounding through the ED.

2.3. Selection of participants

There were 2 inclusion criteria: direct patient care health care workers and working at least 20 hours per week in the ED. A minimum sample size of 160 participants was needed to obtain sufficient power (80%) to test the effectiveness of a subsequent intervention study. There were approximately 800 eligible participants at the 6 hospitals: 300 men and 500 women. These eligible participants made up the same proportion of worker categories as those who eventually participated in the study. A proportional recruitment strategy was developed. The goal was to have the same proportion of participants as you would see in the average ED. Therefore, there were more technicians and nurses recruited than physicians, as would be the case on any average day in any US ED. Recruitment flyers were placed in the mailboxes of all physicians (attendings), nurses, patient care assistants (PCAs), paramedics, social workers, physician assistants, and nurse practitioners at the 6 EDs inviting them to participate in the survey study and subsequent intervention study. The 2 trauma centers were the only hospitals to have emergency medicine residencies; however, a very small percentage of residents made up the physician category. Although residents at these institutions saw between 65% and 90% of the patients primarily, still saw, staffed, and interacted with all of these patients. A representative of the study team met with employees at staff meetings to provide an overview of the study and answer questions. The first 220 employees who volunteered were screened for eligibility. The first 213 health care workers who met the inclusion criteria and fit into an open sample category (occupation and ED site) were invited to participate and completed a baseline survey during August and early September 2009. These data provided demographic and baseline data on all participants [25].

2.4. Method of measurement

The 9 monthly surveys assessed 3 major items in relation to the previous month: number of violent events, feelings of

safety, and feelings of confidence. Assaults and physical threats were defined on the survey:

Physical assaults include hitting with body part, slapping, kicking, punching, pinching, scratching, biting, pulling hair, hitting with an object, throwing an object, spitting, beating, shooting, stabbing, squeezing, and twisting.

Physical threats include actions, statements, and written or nonverbal messages conveying threats of physical injury, which were serious enough to unsettle your mind. It includes expressions of intent to inflict pain, injury, or punishment.

For each assault or physical threat, participants reported the approximate incident date, whether it was an assault or physical threat, whether the perpetrator was a patient or visitor, and if they recorded the incident with their department (incident report or other mechanism). The Safety Scale asked participants to identify how safe they felt while working in the ED the previous month. The Safety Scale included 3 items, each with a 10-point Likert scale, addressing whether they felt safe working in the ED and whether they felt that they would be injured from an assault by a visitor or patient in the next 6 months. The Confidence Scale asked participants to rate their ability to manage violent patients/visitors. These 4 items, with 10-point Likert scale, addressed their ability to manage a patient's or visitor's agitation or verbal aggression, and ability to manage patients or visitors who become verbally abusive, who threaten, or who become physically violent. The Safety and Confidence instruments demonstrated good face and content validity, and the internal reliabilities were high in previous studies (Cronbach $\alpha > .9$) [13,25] (Gates and Fitzwater, 2006, unpublished data). In this study, the α for the safety scale was .75 and .95 for the confidence scale. In September 2009, participants began completing monthly electronic surveys and up to 4 additional monthly violent event surveys.

On the violent event surveys, we asked participants to provide the following information about each of the violent events that occurred that month: date and time of event; perpetrator's age and sex; patient's chief complaint; type of violence; whether an injury was incurred by the worker and, if so, any medical or psychological care received; use of a weapon; whether incident was reported; whether debriefing occurred; and how disturbing the event was. Also, on the violent event survey, participants were asked to complete the Stanford Acute Stress Reaction Questionnaire (SASRQ) that asks about the presence of disturbing symptoms after the violent event. The SASRQ is a 30-item self-report questionnaire that measures dissociative symptoms, traumatic reenactment, avoidance, symptoms of anxiety, and impaired functioning. In addition, the SASRQ has been found to predict the development of posttraumatic stress disorder symptoms [26-29]. The questionnaire was scored according to a Likert-type scale (0-5) or dichotomously (range 0-2 as 0, range 3-5 as 1) for the presence of a symptom. Also part of the violent event survey was the Healthcare Productivity Survey (HPS), a 29-item instrument with 4 scales developed to measure the perceived change in work productivity after exposure to a stressful event [30]. The 4 scales include Cognitive Demands (eg, concentration, keep mind on work), Workload Demands (eg, complete your assignments on time, handle patient load), Support and Communication Demands (eg, provide emotional support, be empathetic), and Competent and Safe Care Demands (eg, be attentive to asepsis, administer medications without errors). We asked participants to rate their ability to perform the work activity after the violent event as compared with before the event. Responses ranged from decreased ability (−2) to increased ability (+2). Psychometric analysis demonstrated strong content and construct validity for the 4 subscales, internal consistency reliability (0.871-0.945), and test-retest reliability ($r = 0.801$, $P < .001$) with a sample of US emergency nurses [30].

2.5. Data collection and processing

Participants signed consent forms and were assigned individual identification numbers. Participants logged into a secure Web site to complete the online surveys each month and received a nominal fee to complete the monthly and violent event surveys ($20 for the baseline survey, $10 for each monthly survey, and $15 for each [up to 4 per month] violent event survey). We sent e-mail reminders if they had not completed the surveys.

2.6. Statistical methods

All statistical analyses were performed using the Statistical Analysis System for the PC version 9.2 (SAS, Cary, NC). Descriptive statistics were used for the violent event, subject, workplace, and perpetrator characteristics. Repeated-measure linear regression model was used for prediction of violent events, acute stress disorder, and productivity. An α level of .05 was used to judge statistical significance. We conducted statistical analysis on individual occupations and combined occupations where roles were similar (registered nurses [RNs] with licensed practical nurses [LPNs] and medical doctors [MDs] with physician assistants [PAs]).

3. Results

3.1. Demographic and occupational characteristics

A total of 213 ED workers participated in the study, of which the majority were RNs (n = 117, 55%), MDs (n = 39, 20%), and PCAs/technicians (n = 22, 12%). Additional statistics for the occupational groups are available in Table 1. The mean age of the participants was 37.3 years (range, 20-65; SD = 10.5); 71% were female and worked an average of 6.6 years in the ED (range, 0-35 years; SD = 7.2). The average hours worked per shift was 11.1 (range, 4-16 hours; SD = 1.5), and the average hours worked per week was 37.7 (range, 20-80 hours; SD = 10.0).

Table 1 Mean number of violent events reported across occupations

Occupation	n	Total events	Assault	Threat
		Mean ± SE	Mean ± SE	Mean ± SE
RN	117	0.61 ± 0.05 *,§	0.15 ±0.02 †	0.46 ± 0.04 ‡
PCA	22	0.58 ± 0.12 *	0.21 ± 0.04 †	0.37 ± 0.09
Paramedic	13	0.39 ± 0.16	0.11 ± 0.06	0.27 ± 0.12
MD	39	0.28± 0.09 *	0.07 ± 0.03 †	0.21 ± 0.07 ‡
LPN	2	0.12 ± 0.40	0.06 ± 0.14	0.06 ± 0.30
PA	4	0.12 ± 0.28	0.03 ± 0.10	0.09 ± 0.22
RN + LPN	119	0.60 ± 0.05 *	0.15 ±0.02 †	0.46 ± 0.04 ‡
MD + PA	43	0.26 ± 0.08 *	0.07 ± 0.03 †	0.20 ± 0.07 ‡

* Significant differences between RN and MD ($P < .0017$), PCA and MD ($P < .05$), RN + LPN and MD + PA ($P < .0007$), and PCA and MD + PA ($P < .03$).

† Significant differences between RN and MD ($P < .04$), PCA and MD ($P < .02$), RN + LPN and MD + PA ($P < .02$), and PCA and MD + PA ($P < .006$).

‡ Significant differences between RN and MD ($P < .002$) and RN + LPN and MD + PA ($P < .0009$).

§ Mean ± standard error.

The breakdown of the patient population was 6% psychiatric, 30% adult only, and 64% general (adult and children). The percentile of participants based on hospital type was 18% suburban, 21% urban, and 61% level 1 trauma center.

3.2. Description of violent events

Participants completed 1795 (93.6%) monthly surveys reporting 827 violent events. The violent event mean per month per person was 0.461. Extrapolating this to 12 months would result in an average of 5.528 violent events per year per person. Of the events, 601 were physical threats; and the mean per month per person was 0.335, translating to 4.017 threats a year per person. Assaults accounted for 226 of the events; and the mean assaults per month per person were 0.126, translating to 1.51 assaults a year per person. Of the 501 violent surveys completed, 341 described physical threats; and 160 described assaults, 20% resulting in an injury. Fig. 1 describes the types and percentages of the 160 assaults reported. For the 827 violent events, workers filed a safety report 42% of the time and filed a police report 5% of the time.

Sixty-three percent of physical threats were perpetrated by men, and more than half were between 30 and 49 years of age. Assailants for assaults were more evenly distributed, with 52% being perpetrated by men and nearly half by assailants between the ages of 30 and 59 years.

Comparing all violent events by occupation revealed significant differences between RNs and MDs ($P = .0017$), and PCAs and MDs ($P < .05$) (Table 1). These differences remained significant when we combined RNs and LPNs and compared with MDs and PAs combined ($P < .0007$). The difference remained significant between the PCAs and the MD/PA group ($P < .03$). These same occupational groups were found to be statistically different with regard to assaults. With regard to threats, there were statistical differences between RNs and MDs ($P < .002$) and the combined groups of RN/LPN and MD/PA ($P < .0009$). There were no significant differences between any other occupational groups for threats or assaults (Table 1). There were no statistically significant differences in violent events (assaults and physical threats) based on sex, age, time of day, hours worked per week, or hospital type.

The only significant difference among the combination of occupations for the 3 questions regarding feelings of safety (each using a 10-point Likert scale) in the ED was between MDs and RNs. Registered nurses felt less safe in the ED compared with MDs ($P = .0041$). This significant difference held true when comparing the RN/LPN combination with the MD/PA combination ($P < .0009$). With regard to the 4

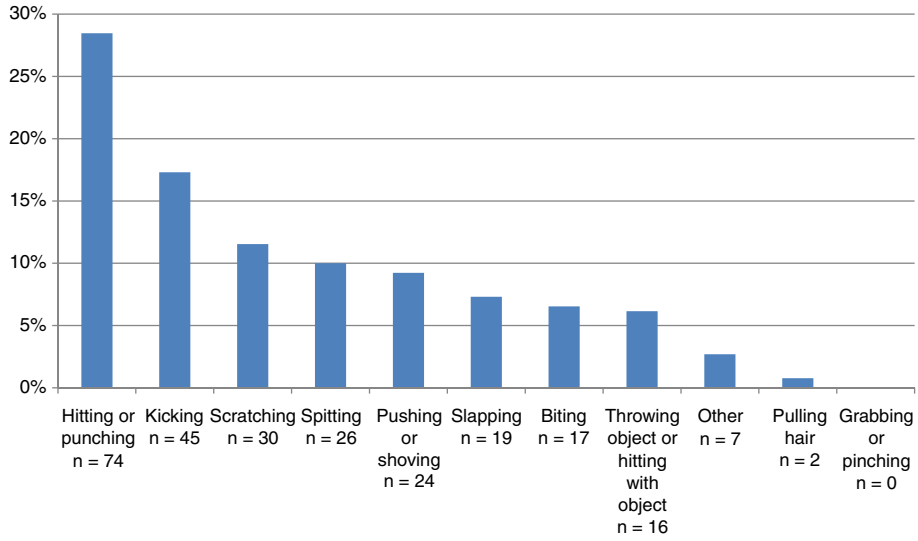

Fig. 1 Types, percentages, and numbers of violent events.

questions addressing workers' confidence in managing violent patients, several significant differences arose. Medical doctors felt more confident than RNs ($P = .013$), and MDs/PAs were more confident than RNs/LPNs ($P < .006$). Registered nurses felt more confident than PCAs ($P < .04$), and RNs/LPNs were more confident than PCAs ($P < .03$). Paramedics were more confident than RNs/LPNs ($P < .03$). Adjustment for sex does not affect the significant difference between MDs and RNs in terms of safety, but this adjustment does negate the difference in confidence.

3.3. Prediction models for violence, acute stress, and productivity

Registered nurses were statistically more likely to be physically threatened than MDs, PAs, and LPNs ($P < .05$). Those with a graduate-level education were less likely to be threatened than those with a 2- or 4-year degree ($P < .001$). Workers who took care of general (adult and pediatric) patients were also less likely to be physically threatened compared with those who took care of adults only and adult psychiatric patients ($P < .01$). Education level was statistically significant; those workers with a graduate education were less likely than those with a 2- or 4-year degree to be physically assaulted ($P < .01$).

When analyzing the prediction model for acute stress symptoms after a violent event occupation (job), debriefing, injury, perpetrator sex, and chief concern met statistical significance. Registered nurses were more likely to experience acute stress than MDs ($P < .001$). Events that were perpetrated by men and resulted in employee injury were associated with significantly higher acute stress scores ($P < .05$). Violent events where the patients presented with trauma or pain and were fast tracked were associated with significantly higher acute stress scores than those where perpetrators had a chief concern of mental status changes ($P < .05$). Analyzing the prediction model for productivity using the HPS revealed several statistically significant findings. Acute stress significantly reduced productivity in general ($P < .001$), having a significant negative impact on the HPS subscales "ability to handle/manage the workload" ($P < .001$) and "ability to handle/manage cognitive demands" ($P < .05$). Violent events with male perpetrators also had a significantly negative impact on the workers' "ability to handle/manage the workload," "provide safe/competent care," and "provide support/communication" (all $P < .05$).

4. Discussion

This study was the first to look at violence against ED health care workers monthly over a 9-month period. The participants represented a cross section of ED health care occupations, and data were collected from a variety of settings that make up the majority of EDs in the United States. Like many other researchers, we found a high prevalence of assaults and threats of physical assaults among all the workers [1-4,7-14]. However, the prevalence rate in this study was somewhat lower than that quoted in many other studies [1-4,7-14,17-24]. Although this could be by chance that these 6 hospitals have lower rates of worker-related violence, it is more likely that the longitudinal design of the study more accurately reveals the true rate. Most, if not all, other studies have relied on recalling events that occurred 6 to 12 months earlier [1-4,7-14]. This approach introduces potential recall bias and, given the traumatic effects of violence on the workers, likely overestimates the number of events [4,31-34]. Another possible reason for the lower rate was the convenience sample. In addition, those experiencing WPV may have chosen to not complete the survey so as not to "relive" the experience; or it would take longer for them to describe the incident. Although lower than other studies, the rates in this study were not insignificant. Based on these results, the average ED health care worker can expect to be physically threatened at least 4 times a year and physically assaulted more than once per year.

No occupation was immune to the assaults and threats, and there were significant differences between occupations. Rates were particularly high for nurses and PCAs. This may be attributable to nurses and PCAs frequently interacting with patients earlier than MDs and PAs and for longer periods of time, increasing the chances of being physically threatened. Although there are typically more female nurses than male nurses, there was no significant difference for violent events for men or women in any occupation. This reinforces the fact that men are not immune. Being older and potentially more "seasoned" did not influence the incidence of violence. Although it might be expected that more violence occurs at night, especially with the increase in alcohol use at night, this study showed that time of day had no influence on the incidence of violence. There was no difference in violence at any of the hospital types. Suburban hospital ED workers experienced similar rates of violence as urban and level 1 trauma center hospitals.

Like other studies, we found that underreporting incidents to administration or authorities appears to be the norm [2,3]. Less than half of the incidents reported to the researchers were reported to hospital authorities, and only 5% of assaults were reported to police. Many reasons are cited in the literature such as a fear of retaliation by administration [35]. Regardless of the reason, reporting is important; otherwise, administration will not know the extent of the problem and may not devote sufficient resources. The National Institute for Occupational Safety and Health, as part of the Centers for Disease Control and Prevention, has long sought to prevent work-related injury and illness by working with various organizations to expand awareness of worker safety and health [36,37]. The Occupational Safety and Health Administration provides guidelines to help facilitate the involvement of employers in preventing violence to those at risk [38]. In similar fashion, The Joint Commission's Environment of

Care standards mandate that health care facilities address and maintain a written plan describing their methods for providing security to patients, visitors, and staff alike while requiring regular risk assessments that address the potential for, prevention of, and response to acts of violence against any individual using or providing its services [39]. Some state and federal legislatures have sought to curb violence in the health care system. The California Occupational Safety and Health Act legally requires employers to establish, incorporate, and maintain violence prevention programs and was later found to correlate temporally with an overall decrease in violent events after its implementation [40,41].

This study also dispelled the myth that men were responsible for the vast majority of physical assaults. In this study, women perpetrated 48% of the assaults. However, male perpetrators were significantly more likely to elicit a higher acute stress score. This is likely due to the fact that men are generally larger than women and more likely to inflict more significant pain and injuries. Men did account for nearly two-thirds of the physical threats. Male perpetrators of assault were also significantly more likely to impact workers' ability to be productive in the areas of handling and managing the workload, providing safe and competent care, and providing worker support and communication. This supports a strong argument for prevention programs given the potential significant impact on workers with regard to patient care. Many ED workers (more than 50% of the present cohort) work in this high-risk environment without any formal violence prevention training [25].

This study reiterated the fact that nurses feel less safe than physicians. This is not surprising, as nurses often encounter patients prior to physicians and for greater lengths of time. This increased and early exposure to patients potentially increases the perception of nurses that they could be the victim of a violent act and, conversely, make physicians feel less vulnerable. In addition, physicians may feel more safe because patients are dependent upon them to get their medical needs met. This may be a false sense of security, given that there was no significant difference in the incidence of assaults for any occupational group.

Groups that were more at risk of being physically threatened included those with less education and those who worked in adult-only and psychiatric settings vs general EDs. Specifically, those with graduate degrees were less likely to be threatened than those with less education. The graduate degree participants are likely to be physicians, who were statistically less likely than nurses (who generally have 2- and 4-year academic degrees) to be threatened. The participants who worked in general EDs, where they saw adults and pediatrics, were less likely to be physically threatened than those who worked in psychiatric EDs and in adult-only EDs. The increased incidence of threats in the psychiatric EDs is somewhat predictable, as studies have shown that psychiatric wards are also a high-risk setting for violence against health care workers [1,18,34,42,43]. The adult-only EDs in this study were the 2 level 1 trauma centers. Trauma is often associated with substance abuse, and this is associated with higher rates of violence [11,44-51]. In addition, having children present in the ED may dissuade some adult patients from acting in a violent manner.

Increased stress is not uncommon and not unexpected following a violent event. Nurses experienced significantly greater stress following a violent event compared with physicians. Given the "frontline" position and the increased number of physical threats, this finding is not surprising. Presence of an injury was associated with increased acute stress scores. This too is not surprising given that there are profound effects on victims, ranging from decreased job satisfaction to symptoms of posttraumatic stress disorder [4,30-34]. The physical and psychological injuries can result in financial losses to both the employee and employer [15,25].

Acute stress significantly reduced productivity, particularly the worker's ability to handle and manage the workload, and interfered with cognitive demands. These findings have significant potential implications for patient safety. These findings support the need for workers to partner with administration to develop and/or enhance education on violence prevention. Current training has focused primarily on self-defense techniques and has not been appropriately tailored to suit the ED. Gates et al [15,52] and Kelen and Catlett [15,52] have called for regular institutional threat and security assessments to be coupled with a model of education that can help staff to identify aggression as well as systematically work to alleviate threats before they escalate [15,52]. Educational programs need to emphasize early intervention strategies that can help prevent aggressive behaviors from escalating into violence. Fernandes et al [53] reported on an educational program that emphasized the importance of early assessment and deescalation techniques. Emergency department health care workers demonstrated an ability to learn the skills necessary to manage patients with aggressive or violent tendencies. However, they found that the significant difference in behavior did not extend beyond 3 months, further emphasizing the need for continuing education. Reasons suggested for the lack of any formal violence prevention training by hospitals have included the culture of acceptance of violence and a lack of administrative support to appropriately address the deficiencies [25]. Without addressing both the lack of support and flawed perceptions among all ED stakeholders, it is unlikely that any type of training program will fully realize success in reducing the incidence of WPV or its negative effects. To date, the authors are not aware of any single intervention program that has been proven to reduce and sustain decreased acts of violence against health care workers.

4.1. Limitations

There are several limitations to this study. The participants were not randomly selected. Thus, it is not known whether those who participated looked different than those who did not participate in terms of their violent experiences,

personal characteristics, and feelings of safety and confidence. In addition, participants were volunteers chosen on a first-come, first-serve basis; and participants comprised only 26% of the eligible subjects. This relatively low number of participants at each site could skew the results at any one site or for the group as a whole. The data were self-reported, and the participant's recall may not be accurate. However, because of the fact that the participants were asked to recall experiences over a short period, the previous month, recall bias is likely to have been nearly nonexistent. The fact that the study surveyed a variety of ED providers and hospitals provides support for the universality of the problem in this health care setting.

Another limitation is that the participants were reimbursed a nominal fee for completing the monthly and violent event surveys. Given the reimbursement model, participants may have lowered their threshold regarding a violent event; so they could report it in the survey and increase their reimbursement. Although this is a possibility, it is unlikely to have occurred given that the prevalence rates in this study are lower than others that have been reported.

In addition, the surveys of stress and productivity ask for the participants' opinion; and therefore, actual effect on work productivity and patient safety is not known. This study was not designed to validate these variables.

5. Conclusion

Emergency department health care workers are relatively frequent victims of violence perpetrated by patients and visitors. This violence results in injuries, acute stress, and loss of productivity. Furthermore, the acute stress has negative consequences on the ability to perform their duties following the violent event. This has serious potential consequences to the workers as well as the care they provide with regard to patient safety. Given the potential serious consequences following a violent event, significant efforts should be made to prevent WPV from happening through worker education and prevention programs. To date, we lack interventions to effectively decrease WPV over the long term; and clearly, more research is needed.

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References

[1] U.S. Bureau of Labor and Statistics, Janoch JA, Smith TS. Workplace safety and health in the health care and social assistance industry, 2003-2007. U.S. Bureau of Labor and Statistics. Web site: http://www.bls.gov/opub/cwc/sh20100825ar01p1.htm, Accessed December 17, 2011.

[2] McPhaul KM, Lipscomb JA. Workplace violence in health care: recognized but not regulated. Online J Issues Nurs 2004;9(3):7.

[3] May DD, Grubbs LM. The extent, nature, and precipitating factors of nurse assault among three groups of registered nurses in a regional medical center. J Emerg Nurs 2002;28(1):11-7, http://dx.doi.org/10.1067/men.2002.121835.

[4] Gerberich SG, Church TR, McGovern PM, et al. An epidemiological study of the magnitude and consequences of work related violence: the Minnesota Nurses' Study. Occup Environ Med 2004;61(6):495-503, http://dx.doi.org/10.1136/oem.2003.007294.

[5] American Nurses Association 2006 House of Delegates. Workplace abuse and harassment of nurses. American Nurses Association Web site. http://www.nursingworld.org/search.aspx?SearchPhrase=Workplace%20abuse%20and%20Harassment%20of%20nurses. Accessed December 17, 2011.

[6] Emergency Nurses Association. (2010a). Position statement: violence in the emergency care setting. Retrieved from http://www.ena.org/SiteCollectionDocuments /Position%20Statements/Violence_in_the_Emergencys_Care_Setting_-_ENA_PS.pdf. Emergency Nurses Association. (2010b). White papers: violence in the emergency care setting. Retrieved from http://www.ena.org/SiteCollectionDocuments/Position% 20Statements/Violence_in_the_Emergency_Care_Setting_-_ENA_White_Paper.pdf.

[7] Gacki-Smith J, Juarez AM, Boyett L, et al. Violence against nurses working in US emergency departments. J Nurs Adm 2009;39(7–8):340-9, http://dx.doi.org/10.1097/NNA.0b013e3181ae97db.

[8] Pich J, Hazelton M, Sundin D, Kable A. Patient-related violence against emergency department nurses. Nurs Health Sci 2010;12(2):268-74, http://dx.doi.org/10.1111/j.1442-2018.2010.00525.x.

[9] Crilly J, Chaboyer W, Creedy D. Violence towards emergency department nurses by patients. Accid Emerg Nurs 2004;12(2):67-73, http://dx.doi.org/10.1016/j.aaen.2003.11.003.

[10] Benham M, Tilotson RD, Davis SM, et al. Violence in the emergency department: a national survey of emergency medicine residents and attending physicians. J Emerg Med 2011;40(5):565-79.

[11] Kowalenko T, Walters BL, Khare RK, et al. Workplace violence: a survey of emergency physicians in the state of Michigan. Ann Emerg Med 2005;46(2):142-7, http://dx.doi.org/10.1016/j.annemergmed.2004.10.010.

[12] Grange JT, Corbett SW. Violence against emergency medical services personnel. Prehosp Emerg Care 2002;6(2):186-90.

[13] Gates DM, Ross CS, McQueen L. Violence against emergency department orkers. J Emerg Med 2006;31(3):331-7, http://dx.doi.org/10.1016/j.jemermed.2005.12.028.

[14] Koritsas S, Coles J, Boyle M, et al. Prevalence and predictors of occupational violence and aggression towards GP's: a cross sectional study. Br J Gen Pract 2007;57(545):967-70.

[15] Gates D, Gillespie G, Succop P. Violence against nurses and its impact on stress and productivity. J Nurs Eco 2011;29(2):59-66.

[16] Gates D. The epidemic of violence against healthcare workers. Occup Environ Med 2004;61(8):649-50, http://dx.doi.org/10.1016/j.annemergmed.2004.10.010.

[17] Howard PK, Gilboy N. Workplace violence. Adv Emerg Nurs J 2009;31(2):94-1000, http://dx.doi.org/10.1097/TME.0b013e3181a34a14.

[18] U.S. Department of Labor, Bureau of Labor Statistics. Revisions to the 2007 census of fatal occupational injuries (cfoi) Washington, DC. retrieved from http://www.bls.gov/iif/oshwc/cfoi/cfoi_revised07.pdf. Accessed December 17, 2011.

[19] Ayranci V. Violence toward health care workers in emergency departments in West Turkey. J Emerg Med 2005;28(3):361-5, http://dx.doi.org/10.1016/j.jemermed.2004.11.018.

[20] Boz B, Acan K, Ergin A, et al. Violence toward health care workers in emergency departments in Denizili, Turkey. Adv Ther 2006;23(2):364-9, http://dx.doi.org/10.1007/BF02850142.

[21] Hesketh KL, Duncan SM, Estabrooks CA, et al. Workplace violence in Alberta and British Columbia hospitals. Health Policy 2003;63(3): 311-21, http://dx.doi.org/10.1016/S0168-8510(02)00142-2.
[22] Hodge AN, Marshal AP. Violence and aggression in the emergency department: a critical care perspective. Aust Crit Care 2007;20(2): 61-7, http://dx.doi.org/10.1016/j.aucc.2007.03.001.
[23] Ladau SF, Bendalak Y. Personnel exposure to violence in hospital EM wards: a routine activity approach. Aggress Behav 2008;34(1):88-103, http://dx.doi.org/10.1002/ab.
[24] Merecz D, Rymanszewska J, Moscicka A, Kiejna A, et al. Violence at the workplace—a questionnaire survey of nurses. Eur Psychiatry 2006;21(7):442-50, http://dx.doi.org/10.1016/j.eurpsy.2006.01.001.
[25] Gates D, Gillespie G, Kowalenko T, et al. Occupational and demographic factors associated with violence in the emergency department. Adv Emerg Nurs J 2011;33(4):303-13.
[26] Cardeña E, Koopman C, Classen C, et al. Psychometric properties of the Stanford Acute Stress Reaction Questionnaire (SASRQ): a valid and reliable measure of acute stress. J Trauma Stress 2000;13(4): 719-34, http://dx.doi.org/10.1023/A:1007822603186.
[27] Classen C, Koopman C, Hales R, et al. Acute stress disorder as a predictor of posttraumatic stress symptoms. Am J Psychiatry 1998;155:620-4.
[28] Koopman C, Classen C, Spiegel D. Predictors of posttraumatic stress symptoms among survivors of the Oakland/Berkeley, California, firestorm. Am J Psychiatry 1994;151:888-94.
[29] Lofland JH, Pizzi L, Frick KD. A review of health-related workplace productivity loss instruments. Pharmacoeconomics 2004;22(3): 165-84.
[30] Gillespie GL, Gates DM, Succop P. Psychometrics of the Healthcare Productivity Survey. Adv Emerg Nurs J 2010;32(3):258-71, http://dx.doi.org/10.1097/TME.0b013e3181e97510.
[31] Catlette M. A descriptive study of the perceptions of workplace violence and safety strategies of nurses working in level 1 trauma centers. J Emerg Nurs 2005;31(6):519-25, http://dx.doi.org/10.1016/j.jen.2005.07.008.
[32] Gates DM, Gillespie GL. Secondary traumatic stress in nurses who care for traumatized women. J Obstet Gynecol Neonatal Nurs 2008;37(2):243-9, http://dx.doi.org/10.1111/j.1552-6909.2008.00228.
[33] Laposa JM, Alden LE, Fullerton LM. Work stress and posttraumatic stress disorder in ED nurses/personnel. J Emerg Nurs 2003;29(1):23-8, http://dx.doi.org/10.1067/men.2003.7.
[34] U.S. Department of Labor, Bureau of Labor Statistics. Nonfatal occupational injuries and illnesses requiring days away from work, 2007. Retrieved from http://www.bls.gov/iif/oshwc/osh/case/osnr0031.pdf.
[35] Gates D, Gillespie G, Smith C, et al. Using action research to plan a violence prevention program for emergency departments. J Emerg Nurs January 2011;37(1):32-9.
[36] Centers for Disease Control, Prevention. Healthcare workers. CDC Web site: http://www.cdc.gov/niosh/topics/healthcare. Accessed December 17, 2011.
[37] Department of Health Human Services, National Institute of Occupational Safety and Health. Violence: occupational hazards in hospitals. Centers Of Disease Control And Prevention Web site. http://www.cdc.gov/niosh/pdfs/2002-101.pdf. Accessed December 17, 2011.
[38] U.S. Department of Labor. Guidelines for preventing workplace violence for healthcare and social service workers. Occupational Safety and Health Administration U.S. Department of Labor Web site. http://www.osha.gov/Publications/OSHA3148/osha3148.html. Accessed December 15, 2011.
[39] Joint Commission. Preventing violence in the healthcare setting, issue 45, retrieved December 11, 2011. from http://www.jointcommission.org/SentinelEvents/SentinelEventAlert/sea_45.htm.
[40] Howard J. State and local regulatory approaches to preventing workplace violence. Occup Med 1996;11:293-301.
[41] Peek-Asa C, Casteel C, Allareddy V, et al. Workplace violence prevention programs in hospital emergency departments. J Occup Environ Med 2007;49(7):756-63, http://dx.doi.org/10.1097/JOM.0b013e318076b7eb.
[42] US Bureau of Labor and Statistics: nonfatal occupational injuries and illnesses requiring days away from work for state and local government workers, 2008. Bureau of Labor and Statistics. Web site http://www.bls.gov/news.release/archives/osh2_02242010.pdf. Accessed December 18, 2011.
[43] US Bureau of Labor and Statistics: nonfatal occupational injuries and illnesses requiring days away from work, 2010. Bureau of Labor and Statistics. Web site: http://www.bls.gov/news.release/archives/osh2.nr0. Accessed December 18, 2011.
[44] Hadfield RJ, Mercer M, Parr MJ. Alcohol and drug abuse in trauma. Resuscitation 2011;48(1):25-36.
[45] Field CA, Claassen CA, O'Keefe G. Association of alcohol use and other high-risk behaviors among trauma patients. J Trauma 2001;50(1):13-9.
[46] Soderstrom CA, Dischinger PC, Kerns TJ, et al. Epidemic increases in cocaine and opiate use by trauma center patients: documentation with a large clinical toxicology database. J Trauma 2001;51:557-64.
[47] Bowley DM, Rein P, Cherry R, et al. Substance abuse and major trauma in Johannesburg. S Afr J Surg 2004;42(1):7-10.
[48] Boles SM, Miotto K. Substance abuse and violence: a review of the literature. Aggress Violent Behav 2004;8(2):155-74.
[49] Fazel S, Langstrom N, Hjern A, et al. Schizophrenia, substance abuse, and violent crime. JAMA 2009;301(19):2016-23.
[50] Thomson L, Wilson J, Robinson L. Predictors of violence in mental illness: the role of substance abuse and associated factors. J Forens Psychiatry Psychol 2009;20(6):919-27.
[51] Cohen JB, Dickow A, Horner K, et al. Abuse and violence history of men and women in treatment for methamphetamine dependence. Am J Addict 2003;12(5):377-85.
[52] Kelen GD, Catlett CL. Violence in the healthcare setting. JAMA 2010;304(22):2530-1, http://dx.doi.org/10.1001/jama.2010.1795.
[53] Fernandes CMB, Raboud JM, Christensen JM, et al. The effect of an education program on violence in the emergency department. Ann Emerg Med 2002;39(1):47-55, http://dx.doi.org/10.1067/mem.2002.121202.

Appendix 1

Safety scale and questions:

I feel safe (free from violence) when working in the ED.

1	2	3	4	5	6	7	8	9	10
Strongly Disagree									Strongly Agree

I think there is a good chance of being injured from an assault by a PATIENT while working in the ED during the NEXT 6 MONTHS.

1	2	3	4	5	6	7	8	9	10
Strongly Disagree									Strongly Agree

I think there is a good chance of being injured from an assault by a VISITOR while working in the ED during the NEXT 6 MONTHS.

1	2	3	4	5	6	7	8	9	10
Strongly Disagree									Strongly Agree

Confidence scale and questions:

Your ability to manage a patient's or visitor's AGITATION OR VERBAL AGGRESSION?

1	2	3	4	5	6	7	8	9	10
Not Confident at all									Extremely Confident

Your ability to manage patients or visitors who become VERBALLY ABUSIVE to you or your coworkers?

1	2	3	4	5	6	7	8	9	10
Not Confident									Extremely Confident

Your ability to manage patients or visitors who PHYSICALLY THREATEN you or your coworkers?

1	2	3	4	5	6	7	8	9	10
Not Confident									Extremely Confident

Your ability to manage patients or visitors who become PHYSICALLY VIOLENT towards you or your coworkers?

1	2	3	4	5	6	7	8	9	10
Not Confident at all									Extremely Confident