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RESEARCH ARTICLE

Factors associated with physical injury or police involvement during incidents of workplace violence in hospitals: Findings from the first year of California's new standard

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Abstract

Background: Workplace violence in healthcare settings is known to be a costly and often underreported problem. In California, hospitals are required to report incidents of violence towards workers to the California Occupational Safety and Health Administration (CalOSHA) using an online reporting system that went into effect in 2017.

Methods: Reports submitted to CalOSHA from July 2017 to September 2018 pursuant to this new requirement were analyzed using descriptive methods and logistic regression.

Results: Four hundred eight hospitals submitted reports using the new incident reporting system. Behavioral health units had 1.82 times the odds of the reported incident resulting in physical injury compared to inpatient medical units, and investor-owned facilities had 2.43 times the odds of the reported incident resulting in physical injury compared to city or county-owned facilities. Inpatient and behavioral health units had significantly reduced odds of a reported incident resulting in police involvement when compared to other locations within the hospital.

Conclusions: These findings indicate that protections for healthcare workers deserve ongoing attention from stakeholders and legislators and provide insight into how healthcare facilities report incidents of violence towards workers.

KEYWORDS

California workers, hospital safety, hospital workers, nursing, safety legislation, worker safety, workplace violence

1 | INTRODUCTION

Violence against healthcare workers is a pervasive safety issue that impacts patient care and workforce stability.[1,2] The United States Government Accountability Office reported in 2016 that workers in healthcare settings experienced violence-related injuries at a rate five times higher than workers in other industries.[3] In addition, official figures are likely to underestimate the scope of the problem, with surveys indicating that up to two-thirds of incidents may not be reported through official channels such as hospital incident reporting systems.[1,4,5]

California's Workplace Violence Prevention in Health Care standard (California Code of Regulations, Title 8, Section 3342) went into effect in 2017 and reflects one state's effort to address this problem. The new law requires that hospitals develop a comprehensive violence prevention plan and train all frontline staff. In addition, starting 1 July 2017, general acute care and psychiatric hospitals are required to submit reports of violent events within

72 hours of occurrence to California Occupational Safety and Health Administration (CalOSHA) through a web-based Workplace Violent Incident Reporting System for Hospitals.[6] This new mandate and reporting channel provide an opportunity to better understand the scope of workplace violence for healthcare providers in California.

This paper describes the incidents reported through this new system and investigates whether hospital unit/location, number of staffed beds, and type of hospital ownership are associated with (a) increased odds of the event involving a physical injury, and (b) increased odds of the event resulting in law enforcement involvement. As federal legislation is under consideration to expand protections for healthcare workers, such data will provide useful guidance to workers, industry leaders, and the regulatory community.

2 | METHODS

2.1 | Data

This study used data collected by CalOSHA through the Workplace Violent Incident Reporting System from 1 July 2017 to 30 September 2018. These data reflect reports from general acute care and psychiatric hospitals operating in California during the study period. Hospital representatives are required to register with CalOSHA before submitting reports, and reporting is generally centralized within each hospital. Hospital representatives are responsible for deciding how to collect data within their respective facilities. The five state hospitals in California, responsible for treating the most seriously mentally ill population in the state, are also required to submit reports of workplace violence but do so using a modified reporting procedure. Due to these differences, state hospitals' reporting data are not included in this analysis. Data were obtained from CalOSHA. This study was approved by the (institution name removed for blinding) Human Research Protection Program.

2.2 | Variables measured

The online reporting tool captures multiple characteristics of the incident including type of aggressor (such as patient, visitor, employee, or other), location of incident within the hospital, injury sustained, special circumstances which may have contributed to the situation such as working alone or at a new task, type of support provided to the affected employee, and any planned worksite or work process modifications proposed to mitigate future threats. Dates of the incidents are recorded and each event is assigned a unique identifier by the CalOSHA system.

2.3 | Outcome measures

The first outcome measure of interest to this study is reported physical injury to the victim. This binary indicator includes the injuries described as death, amputation, asphyxiation, burns, bruising/abrasion, cut/puncture, dislocation/fracture, head injury, internal injury, open wound, and sprain/strain. The categories stress/psychological impairment, injury type not listed, and injury type unknown by the hospital at this time were classified as nonphysical injuries. The importance of this outcome measure is to differentiate between the range of events that meet the reporting threshold for California's new regulation. The Violence Prevention in Health Care standard defines workplace violence as "any act of violence or threat of violence that occurs at the worksite" and explicitly states that the incident need not lead to an injury.[7] Given this broad definition, hospital-level reporters must decide what they deem to be reportable, contributing to the true variability in a total number of reported incidents across California's hospital.

Even with the basic incident description, it can be difficult to ascertain the severity of the event based on data collected by the existing web-based system. One missing element from the CalOSHA data collection tool is an overall assessment of the impact or seriousness of the event from the perspective of the reporter. Workplace violence research measurement tools in wide use such as the Overt Aggression Scale[8] and the Staff Observation Aggression Scale[9] both incorporate a severity rating for the incident to assist in the interpretation of findings.

Without this type of distinction, one way to differentiate between less serious and more serious events is to use a binary indicator for physical injury. It is certainly true that this is an imperfect categorization of events as there are incidents that can cause serious impairment without leaving a visible mark on the victim; however, given the nature of the available data, this functions as a crude delineation. In addition, the range of possible injuries is too numerous to consider as individual outcomes for analytic purposes.

The second outcome measure is police deployment to the scene after an incident occurs. The indicator for police deployment includes the responses: officers deployed to the scene, de-escalation without physically subduing the aggressor(s), physically intervened and subdued the aggressor(s), arrested the aggressor(s), and assistance provided that is not listed above. The prompt for this response specifically asks about the local law enforcement response, so this is assumed to reflect a municipal law enforcement response and not a hospital-based private security response.

2.4 | Predictor selection

Previous research in the field has indicated that, while all healthcare workers are at increased risk for experiencing violence on the job, those working in the emergency department or behavioral health treatment settings may be most at risk.[1,10-12] To determine what differences might exist between hospital units for the risk of a reported assault to result in physical injury, the 25 possible locations were grouped into 7 categories: behavioral health units, emergency departments, inpatient units (includes all medical-surgical units where patients spend at least one night), surgery/labor and delivery

units, ambulatory or procedure units (where patients do not spend the night), nonpatient care areas (including parking lots, administrative areas, cafeterias), and location not listed.

In addition, while there is little evidence describing the role of hospital size and ownership category in workplace violence, these factors were included as potential areas of interest in providing a fuller description of the phenomenon in California's hospitals. These facility-level characteristics were extracted from publicly available databases on the California Office of Statewide Health Planning and Development (OSHPD) and the California Department of Public Health (CDPH) websites.

For the 75 hospitals which did not have staffed beds listed, the number of licensed beds was obtained from either OSHPD or CDPH and was multiplied by the mean percentage of staffed beds/licensed beds observed in the other reporting hospitals (0.85). Due to the imprecision of this imputation method, a sensitivity analysis was conducted to test the impact of over- or underestimating the number of staffed beds based on using the mean value of 0.85. The proportion of licensed beds that were staffed for hospitals reporting this information ranged from 0.28 to 1.0 with a standard deviation of 0.2. Using 1.0 as the upper bound and 0.45 as the lower bound (mean: 2 standard deviations), the number of staffed beds was recalculated for each of the 75 hospitals. Using these alternate estimates for a number of staffed beds, the final generalized estimating equations were rerun both with the reduced number of beds and with the increased number of beds. Findings were compared with the equations calculated with the mean percentage (0.85) of beds and were considered significant if a change in the coefficients for the predictors of interest were altered by 0.25 or more, or if the *P* value changed from either side of .05. The number of staffed beds was grouped into four categories (approximately quartiles): small (<60 beds); medium (60-129 beds); large (130-230 beds); and very large (>230 beds). Although bed numbers could be treated as a continuous variable, categories were used in an effort to improve interpretability.

2.5 | Statistical analyses

Hospitals may contribute multiple reports to these longitudinal data, therefore clustering is necessary based on the hospital to account for the nonindependence of observations. It may be the case that unmeasured characteristics of the reporting infrastructure or environment itself contribute to the relationship between the hospital unit and outcome measures. To address this issue statistically, each hospital's unique identifier was incorporated as a cluster in the generalized estimating equations reflecting the final models for each outcome. An independent correlation structure was assumed because it is likely that events reported by each hospital within the study period are independent of each other with regard to the outcomes of interest. The generalized estimating equations were calculated using a binomial family designation and logit link to appropriately reflect each binary outcome of interest. Robust variances were chosen for this model because this allows for an unspecified relationship structure between members of each cluster.[13] The coefficients resulting from each generalized estimating equation were calculated along with each coefficient's 95% confidence interval. Statistical significance was met with a *P* value less than .05.

3 | RESULTS

From 1 July 2017 to 30 September 2018, 11 111 incidents from 408 hospitals were reported to the CalOSHA Workplace Violent Incident Reporting System. Of the 408 hospitals, 373 (91.4%) were general acute care hospitals and 35 (8.6%) were acute psychiatric hospitals. Reporting hospitals had a mean of 177 staffed beds (standard deviation = 177). A large majority of the assailants (93%) were described as patients, and approximately one-third of the incidents resulted in a physical injury to staff (Table 1). Investor-owned hospitals reported a lower proportion of the total incidents in comparison with their total representation in the state, while the city or county-owned facilities reported incidents more frequently (Table 2).

Odds ratios for physical injury and police involvement were calculated using generalized estimating equations with clustering by hospital. Behavior health unit location was associated with 1.82 times the odds of the reported event resulting in a physical injury when compared to inpatient units, controlling for type of hospital ownership and number of staffed beds (Table 3). Reported events from investor-owned facilities were associated with 2.43 times the odds of physical injury when compared with city or county-owned hospitals, controlling for hospital unit location and number of staffed beds. No significant differences for the reported incident resulting in increased or decreased odds of physical injury were found between hospitals based on a number of staffed beds.

TABLE 1 Selected event characteristics (n = 11 111)

Description of event	Percentage (95% CI)
Aggressor described as a patient	93% (92.7-93.7)
Any physical injury reported	33% (32.2-33.9)
Reported that no remediation was taken because there is no continuing threat to employees	78% (77.7-79.2)
Weapon involved (gun, knife, furniture, medical equipment, other weapon)	7.7% (7.2-8.2)

Abbreviation: CI, confidence interval.

TABLE 2 Frequency of events by type of hospital ownership (n = 408)

	Number of facilities (%) (n = 408)	Number of events (%) (n = 11 111)
Type of ownership		
City/county	20 (4.9%)	1111 (10%)
District	40 (9.8%)	744 (6.6%)
Investor	112 (27.5%)	1616 (14.6%)
Nonprofit	228 (55.8%)	7039 (63.4%)
State	8 (2%)	600 (5.4%)

Inpatient and behavioral health units had similar odds of reported incidents resulting in police involvement, however, all other units or location types were associated with substantially increased odds of this outcome (Table 4). Emergency department units, ambulatory care areas, and nonpatient care areas all were associated with approximately five times the odds of police involvement as inpatient hospital units. Hospitals with fewer than 60 staffed beds were associated with 1.57 times the odds of police involvement when compared to larger hospitals with 130 to 230 staffed beds. Both outcomes of interest, odds of physical injury and police involvement, are depicted by hospital location in Figure 1 to better visualize the differences between units with respect to both outcomes under investigation.

TABLE 3 Odds of a reported incident resulting in physical harm to worker by hospital location, ownership type, and number of staffed beds (with clustering by hospital)

Location or facility characteristic	Odds[a] of reported incident resulting in a physical injury (95% CI)	*P* value
Hospital location		
Inpatient (reference)	1	n/a
Behavioral health	1.82 (1.25- 2.64)	.002
Emergency department	0.91 (0.76-1.09)	.323
Surgery/labor and delivery	0.78 (0.49-1.25)	.305
Ambulatory/procedure unit	0.82 (0.56-1.21)	.327
Non-patient care area	0.98 (0.79-1.22)	.863
Other location not listed	0.81 (0.57-1.16)	.255
Number of staffed beds		
<60 beds	0.80 (0.52-1.23)	.304
60-129 beds	0.86 (0.57-1.32)	.501
130-230 beds (reference)	1	n/a
>230 beds	0.73 (0.50-1.07)	.110
Type of ownership		
City/county (reference)	1	n/a
District	1.55 (0.66-3.69)	.312
Investor	2.43 (1.46-4.07)	.001
Nonprofit	1.10 (0.73-1.68)	.644
State	0.79 (0.53-1.19)	.264

Abbreviation: CI, confidence interval.
[a]Calculated using the generalized estimating equation, independent correlation structure, and robust standard errors.

TABLE 4 Odds of an incident resulting in police involvement by hospital location, ownership type, and number of staffed beds (with clustering by the hospital)

Location or facility characteristic	Odds[a] of reported incident resulting in police involvement (95% CI)	*P* value
Hospital location		
Inpatient (reference)	1	n/a
Behavioral health	0.94 (0.61-1.47)	.809
Emergency department	5.15 (4.04-6.56)	<.001
Surgery/labor and delivery	2.40 (1.37-4.20)	.002
Ambulatory/procedure unit	4.80 (3.20-7.20)	<.001
Non-patient care area	6.21 (4.83-8.00)	<.001
Other location not listed	2.52 (1.80-3.53)	<.001
Number of staffed beds		
<60 beds	1.57 (1.08-2.30)	.019
60-129 beds	1.06 (0.73-1.55)	.765
130-230 beds (reference)	1	n/a
>230 beds	0.93 (0.67-1.29)	.658
Type of ownership		
City/county (reference)	1	n/a
District	0.70 (0.39-1.26)	.233
Investor	0.91 (0.53-1.56)	.735
Nonprofit	0.94 (0.57-1.54)	.806
State	0.68 (0.40-1.17)	.163

Abbreviation: CI, confidence interval.
[a]Calculated using the generalized estimating equation, independent correlation structure, and robust standard errors.

Sensitivity analysis was conducted to determine the impact of under- or overestimating the number of staffed beds based on using the mean proportion of licensed beds in reporting hospitals. There were no significant changes to the generalized estimating coefficients for using a lower estimate for the proportion of staffed beds (0.45) or an upper estimate (1.0).

4 | DISCUSSION

This study includes data reported to CalOSHA through the Workplace Violent Incident Reporting System for Hospitals, a new regulation that has the potential to provide a fuller description of a phenomenon that has been historically difficult to track. While there are no directly equivalent data sources which can provide a basis for comparison to these findings, survey-based cross-sectional research has indicated that 75% of emergency room nurses and up to 85% of psychiatric nurses experienced physical or verbal aggression in a month's work.[14-16]

Generally, both emergency department and psychiatric nurses are thought to be the most at risk among hospital employees, frequently tasked with managing patients under the influence of drugs or alcohol or experiencing the acute symptoms of mental illness. While behavioral health unit location showed significantly increased

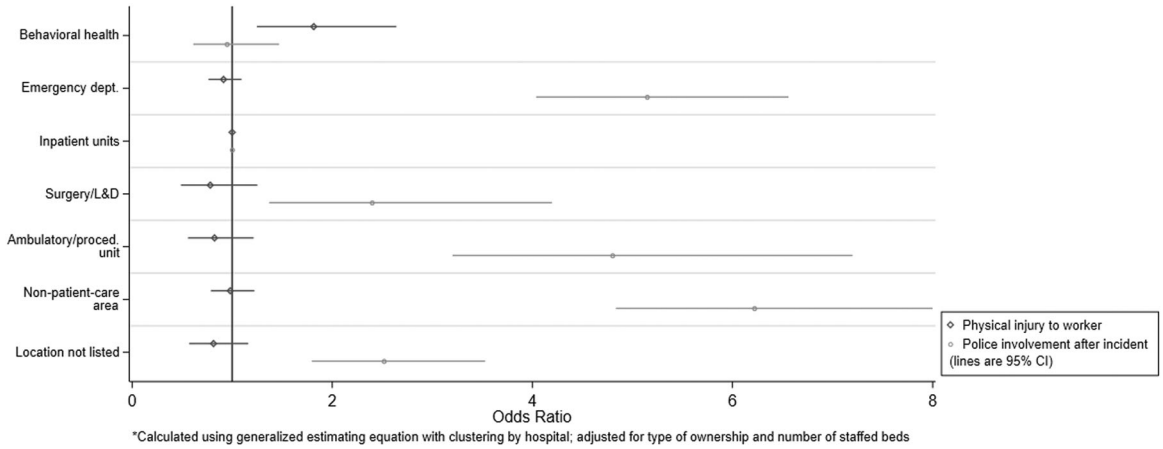

FIGURE 1 Odds ratios for physical injury and police involvement by hospital location

odds of the incident resulting in physical injury in our study, emergency department locations were not associated with increased odds of this outcome. It may be the case that while patients arrive in a state of agitation, the enhanced presence of security personnel in comparison to the behavioral health setting has the potential to reduce the chance of physical injury during an incident. However, the data collected by the Workplace Violence Incident Reporting System do not provide adequate detail to fully describe the differences between settings and further descriptive inquiry in this area could be instructive.

Epidemiologic data collected over a 6-year period ending in 2001 showed an incidence rate for workplace violence of 0.60 incidents/100 000 employee hours in California hospitals, notably with for-profit entities reporting a rate of 0.89 incidents compared to 0.49 incidents for nonprofit organizations.[12] Our study found that investor-owned facilities had 2.43 times the odds of an incident involving physical injury to the worker as those reported by city or county-owned facilities (which were roughly equivalent to nonprofit entities). Again, these data provide sparse detail about hospital reporting culture and what organizational features may be shaping these trends, however, it is notable that these differences between the type of ownership have been detected in prior research.

Management of workplace violence by the legal system has been the subject of continual debate in recent years as states and the federal government determine what consequences should be imposed for those who assault healthcare workers. Thirty-two states deem assault on a healthcare worker to be a felony, automatically escalating any incident beyond what would typically constitute a misdemeanor offense to one leading to a steeper penalty.[17] These legislative initiatives have met resistance, however, particularly for patients' advocates, who caution that increasing intrusion of the criminal justice system on healthcare will have damaging effects on patients' care and recovery. These advocates have argued that hospitals should safely manage patients experiencing the symptoms of mental or physical illness without resorting to arrest or incarceration. Qualitative research has shed light on the complexity of a healthcare worker's decision to classify patient behavior as a criminal instead of symptomatic, especially when the assailant is experiencing symptoms of mental illness.[18] In the United States, these choices are particularly consequential in an era where police mistreatment of those experiencing mental illness has been brought to public awareness.

In this context, the outcome of whether a reported incident resulted in the deployment of the municipal police force can be more fully considered. Data from California's Workplace Violent Incident Reporting system indicate that both inpatient and behavioral health unit locations have significantly lower odds of having the reported incident result in the deployment of police than all other hospital locations. Emergency departments, ambulatory care areas, and non-patient care areas all had at least four times the odds of police deployment as the inpatient and behavioral health units. It is striking that hospital unit locations that have the highest odds of incidents resulting in injury have the lowest odds of law enforcement involvement. It may be the case that staff in behavioral health and inpatient areas contend with these types of ethical decisions more frequently than colleagues in other areas, and may be choosing to manage workplace violence without involving the judicial system.

One alternative consideration in explaining the difference in law enforcement involvement is that hospital-based security may be more engaged in managing incidents of violence in the inpatient or behavioral health units than throughout the rest of hospital facilities, which could reduce the need for seeking additional support from law enforcement. In considering the difference in police response for hospitals with varying numbers of staffed beds, it is notable that the smallest hospitals have significantly increased odds of law enforcement involvement. There are likely multiple characteristics of both the hospitals and law enforcement entities that contribute to this difference, but it is worth noting that the smallest hospitals are also probably least likely to have assigned security personnel on-site who may address safety issues, leading to increased reliance on municipal forces.

5 | LIMITATIONS

There are several limitations to these findings; CalOSHA provides a fuller description of the reporting process and potential challenges to accuracy on their website.[6] In summary of what they have identified, the most significant limitation is the potential challenge to the validity of what is reported. While reporting is mandatory, there is no regulatory mechanism in place to verify the accuracy or completeness of reports, and findings, therefore, pose questions as to whether reported events are a measurement of the true rate within a hospital. Based on the findings presented here, it is clear that further investigation is needed to determine what differences exist between facilities in what they deem reportable, and whether these choices differ based on facility type. Clarifying the reporting process will provide greater insight into what differences exist between number and type of incident across California's hospitals. Furthermore, because reports must be submitted within 72 hours of the event, it may be difficult for reported incidents to include a complete description of the full extent of worker injuries or what mitigation strategies followed. In addition, missing staffed bed numbers were imputed and may be subject to inaccuracies.

6 | CONCLUSION

Beyond providing an additional perspective on the scope of the problem posed by workplace violence in healthcare settings, these findings may also provide insight into reasons for the underreporting of these incidents. For investor-owned facilities, in particular, less frequent reporting compared to other hospitals, combined with the nearly doubled odds of a reported event involving a physical injury, suggests that practices in these settings could merit further investigation. Generally, the new reporting channel and increased regulatory attention to this issue have the potential to increase engagement by all stakeholders and improve safety for workers in healthcare settings.

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CONFLICTS OF INTEREST

The authors declare that there are no conflict of interests.

DISCLOSURE BY AJIM EDITOR OF RECORD

Paul Algirdas Landsbergis declares that he has no conflict of interest in the review and publication decision regarding this article.

AUTHOR CONTRIBUTIONS

RO conceptualized and designed the study, obtained data, conducted the initial data analysis, and drafted the manuscript. OH, RH, and SC provided substantive feedback on data analysis and guidance for interpretation of findings. All authors participated in revision of important content in preparation for publication. All authors approved the final version of this manuscript and agree to be accountable for questions related to its accuracy or integrity.

ETHICS APPROVAL AND INFORMED CONSENT

Work for this study was performed at the University of California San Francisco and the study was approved by the University of California San Francisco Human Research Protection Program. The study was granted exempt status and no individual-level consent was deemed necessary because no individually-identifying information was included in the dataset.

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