


ORIGINAL RESEARCH

Injury Prevention

A workplace violence prevention program targeting high-risk patients in emergency departments

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Abstract

Objective: Patient violence in emergency departments (EDs) may be prevented with proactive mitigation measures targeting potentially violent patients. We aimed to evaluate the effects of two interventions guided by a validated risk-assessment tool.

Methods: A prospective interventional study was conducted among patients ≥ 10 years who visited two EDs in Michigan, USA, from October 2022 to August 2023. During triage, the ED nurses completed the Aggressive Behavior Risk Assessment Tool for EDs (ABRAT-ED) to identify high-risk patients. Following the baseline observational period, interventions were implemented stepwise for the high-risk patients: phase 1 period with signage posting and phase 2 period with a proactive Behavioral Emergency Response Team (BERT) huddle added to the signage posting. Before ED disposition, any violent events and their severities were documented. The data were retrieved retrospectively after the study was completed.

Results: Of 77,424 evaluable patients, 546 had ≥ 1 violent event. The violent event rates were 0.93%, 0.68%, and 0.62% for baseline, phase 1, and phase 2, respectively. The relative risk of violent events for phase 1 compared to the baseline was 0.73 (95% confidence interval [CI]: 0.59–0.90; $p = 0.003$). The relative risk for phase 2 compared to phase 1 was 0.92 (95% CI: 0.76–1.12; $p = 0.418$).

Conclusion: The use of signage posting as a persistent visual cue for high-risk patients identified by ABRAT-ED appears to be effective in reducing the overall violent event rates. However, adding proactive BERT huddle to signage posting showed no significant reduction in the violent event rates compared to signage posting alone.

KEYWORDS

BERT, emergency department, risk assessment, signage, violence prevention

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1 | INTRODUCTION

1.1 | Background

Workplace violence (WPV) in healthcare settings is a preventable occupational hazard that has serious negative impacts on healthcare workers. The Joint Commission requires compliance with the WPV Prevention Standards for hospital accreditation in the USA.¹ The new and updated standards include the implementation and annual evaluation of WPV prevention programs, as well as the adoption of standardized methods for collecting and reporting violent events to allow proper assessments of such programs.

Despite increased awareness and concerted efforts to reduce WPV in emergency departments (EDs), patient violence rates appear to be increasing in recent years. According to the Press Ganey's National Database of Nursing Quality Indicators report in 2022, more than two nurses experience assaults every hour, and the EDs are the second highest location in hospitals where assaults occur, with the patients being the most common perpetrators.² The national surveys of ED physicians conducted in 2018 and 2022 showed increasing rates of patient violence.³ The physical assault rate increased from 47% to 55% and seeing others being assaulted increased from 71% to 79%.

Hospitals have an obligation to meet federal safety regulations with potential financial impacts. The Centers for Medicare & Medicaid Services (CMS) published a memorandum in 2022 emphasizing the importance of identifying potentially violent patients and implementing violence mitigation strategies.⁴ The memo cites examples of failed WPV prevention and suggests a potential loss of the Medicare Conditions of Participation. In 2023, the Occupational Safety and Health Administration (OSHA) released a preliminary report by the Small Business Advocacy Review (SBAR) Panel on Potential Standard for Prevention of Workplace Violence in Healthcare and Social Assistance with an attempt to reduce not only the violence rates but also their severities.⁵ In California, the Cal/OSHA standard requiring hospitals to file annual hospital violence data became effective in 2017.⁶ However, an analysis of 3 years of the collected data on hospital violence showed a lack of standardized definition of WPV and inconsistent collection methods, which made proper assessment of patient violence impossible across various institutions.⁷

For regulatory compliance, there is a need for a standardized tool for collecting violent event data. The Violent Event Severity Tool (VEST) was developed to collect various violence types and severities, which would facilitate reliable assessment of violence prevention strategies over time.⁸ In addition, a validated violence risk screening tool would be useful in implementing patient violence prevention programs. The Aggressive Behavior Risk Assessment Tool for EDs (ABRAT-ED) has been developed and previously validated for assessing violence risk during ED triage.⁹ Such a screening tool could help provide focused preventive interventions to the subset of patients at a high risk of violence. Although universal violence precaution analogous to universal body-fluid precaution has been recommended, individualized precau-

The Bottom Line

This 10-month prospective, interventional study of 77,424 patients with retrospective data retrieval evaluated the effects of signage posting and proactive Behavioral Emergency Response Team huddle in two emergency departments (EDs). Patients at high risk for violence were identified during triage with the Aggressive Behavior Risk Assessment Tool for EDs. The signage posting targeting high-risk patients was modestly effective in reducing violent events in the EDs.

tion would be preferable rather than indiscriminate regard of every patient as potentially violent.^{10,11}

1.2 | Importance

Various strategies for WPV prevention against healthcare workers in EDs have been implemented, mainly focused on secondary or tertiary preventive measures initiated during or after the patients' behavioral emergencies.¹² Although primary prevention is preferred to avert violent behaviors before they occur, there is a dearth of evidence showing the effectiveness of proactive interventions.¹³ Furthermore, instead of reporting the real-time collection of patient data, most of the reported studies showing effectiveness are either descriptive or derived from healthcare providers' experience using their subjective recalls of violent events, which may have introduced recall bias.^{14,15}

Team-based, multifaceted interventions have been commonly used to enhance staff safety during verbal or physical behavioral emergencies, such as Behavioral Emergency Response Team (BERT), Behavioral Response System, or Best Practices in the Evaluation and Treatment of Agitation (Project BETA).¹⁶⁻²¹ The goal of these interventions is to educate and train staff about de-escalation techniques during violent events and to reduce the use of chemical or physical restraints. Most of the previous studies reported improved staff perception of safety, knowledge, and confidence in managing violent patients, as well as decreased violent events as reported by staff.^{15,19,22-25} A previous study reported that signage was considered the most effective component among the multifaceted interventions for reducing violent events.²³ However, there is limited evidence demonstrating the usefulness of signage as an independent preventive measure against violent events.

1.3 | Goals of this investigation

The primary aim of this study was to evaluate the effects of proactive violence prevention interventions, including signage posting to increase the staff's situational awareness and the BERT huddle,

targeting patients at high risk of violence in EDs. The secondary aim was to explore the predictors of patients with violent events.

2 | METHODS

2.1 | Study design

A 10-month prospective interventional study design was used with retrospective data retrieval. All patients were screened with ABRAT-ED as a part of routine nursing triage assessments, and those with ABRAT-ED scores ≥ 5 were considered to be at a high risk of violence. WPV prevention interventions targeting high-risk patients were implemented in two sequential phases after the 2-month baseline observational period. In the phase 1 period of 4-month duration, signage was posted proactively for the high-risk patients, followed by the phase 2 period of an additional 4-month duration, when the proactive BERT huddle intervention was added to the signage posting. All patients in phases 1 and 2 with ABRAT-ED scores < 5 did not receive any proactive interventions. Before disposition from the EDs, the VEST was completed to capture any violent event types and severities. The ABRAT-ED and VEST were embedded in the electronic health records (EHRs) as routine nursing assessments for all patients.

This study was reviewed and determined by the organization's Institutional Review Board as not meeting the definition of human subjects research as defined by the US Department of Health and Human Services or Food and Drug Administration regulations. Following the study completion, an honest broker, independent of the study team, retrospectively retrieved the de-identified data from the EHRs in compliance with the Privacy Rule of the Health Insurance Portability and Accountability Act.

2.2 | Setting and participants

All patients ≥ 10 years visiting the two EDs in Michigan, USA, were screened with ABRAT-ED for violence risk and assessed for violent events with VEST before disposition from October 18, 2022, to August 23, 2023. The adult ED is a level 1 trauma center with 84 care spaces servicing a 589-bed medical center. The pediatric ED is also a level 1 trauma center with 36 care spaces, servicing a 234-bed pediatric hospital. These departments are part of a magnet-designated medical center.

2.3 | Interventions

Before the initiation of the study, a 1-month pilot study was carried out to educate ED staff, including posting and emailing an educational flier and frequently asked questions. The unit leaders discussed the study at their ED huddles during the first 2 weeks of the pilot to ensure awareness and address any questions. Spot checks and feedback were performed weekly to monitor any flaws in the EHR build and ensure adherence to the required documentation in the EHRs.



FIGURE 1 Signage.

After the pilot, the baseline observation was conducted from October 18 to December 13, 2022. The preventive interventions were then implemented in two steps. The phase 1 intervention from December 14, 2022, to April 19, 2023, included the proactive posting of signage at the bedside or outside the patient room for the patients at high risk for violence with ABRAT-ED score ≥ 5 . The signage consists of an image of a white-colored exclamation mark in a triangle shape on a burgundy background (Figure 1). Besides the posting of signage, staff were instructed to use the safety training they had previously received to manage the high-risk patients in a safe and appropriate manner.

The phase 2 intervention from April 20 to August 23, 2023, added a proactive BERT huddle to the signage posting for patients at high risk for violence with ABRAT-ED score ≥ 5 . Prior to this study, the BERT huddle was reactive, that is, activated only after violent events, but it was rarely utilized in practice. The BERT huddle team included the nurse, the healthcare provider, a social worker, and security personnel. The team utilized an established protocol: understanding how the team can help the patient; de-escalation plan with a therapeutic alliance; medications and interventions according to Project BETA; environmental modifications and comfort measures; physical restraints only when necessary; and planning for the least restrictive disposition. During phases 1 and 2, the signage was posted reactively following any violent events regardless of the ABRAT-ED scores.

2.4 | Measurements

This study used the validated seven-item ABRAT-ED to identify potentially violent patients.⁹ This yes-no checklist consists of two history items of past aggression and mental illness, ED visit reasons item, and four nursing assessment items of confusion, staring, agitation, and aggressive/threatening behaviors. The ED visit reasons item included suicidal ideation/suicide attempt, behavioral health concern, psychiatric evaluation, and aggressive behavior. The ABRAT-ED scores were automatically calculated by the EHRs using appropriate item weightings. Although the cutoff score of 4 was originally recommended for a high risk of violence, the current study used a slightly higher cutoff score of 5 to reduce the demands on resource-intensive BERT huddle activations. The sensitivity and specificity of ABRAT-ED at the cutoff score of 5 were 61.4% and 99.5%, respectively. This indicates that 61.4% of violent patients had ABRAT-ED scores ≥ 5 (true positive) and 99.5% of non-violent patients had ABRAT-ED scores < 5 (true negative). The positive and negative likelihood ratios (LR+ and LR-) are 123 and 0.388, respectively. As a part of the routine initial nurs-

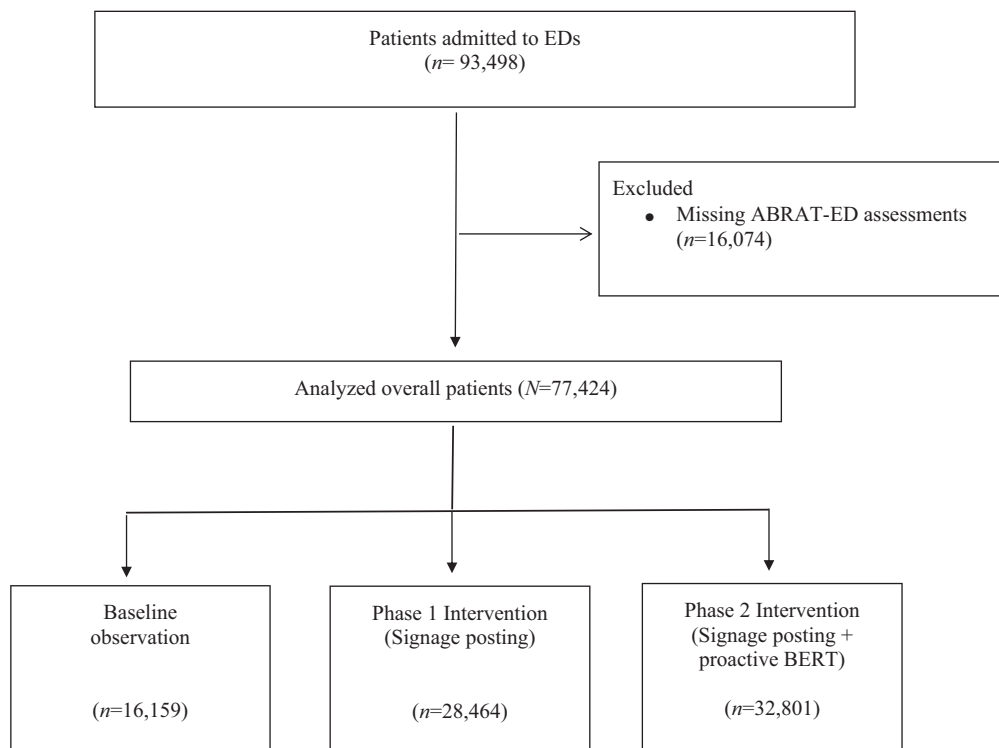


FIGURE 2 Study flow chart of patients admitted to emergency departments (EDs). ABRAT-ED, Aggressive Behavior Risk Assessment Tool for EDs; BERT, Behavioral Emergency Response Team.

ing assessments of walk-in patients, ABRAT-ED was completed by the triage nurses, whereas it was completed by the assigned ED nurses for patients arriving in ambulances.

The VEST was used to collect data on various types and severities of violence.⁸ The VEST provides operational definitions of six violence types, including physical assault, physical threat, verbal threat, verbal abuse, sexual harassment, and written threat. Each violence type includes severity criteria ranging from grade 1 (mild) to grade 4 (life threatening) to objectively capture the events. The VEST was completed by the assigned ED nurses either at the time of the violent event or at the ED disposition.

2.5 | Outcomes

The primary outcome was the violent event rate, defined as the number of patients with one or more violent events per 100 ED admissions. The violent event rates between the baseline and phase 1 were compared to assess the effect of the signage posting. Likewise, the violence event rates between phases 1 and 2 were compared to determine the effect of adding BERT huddle to the signage posting.

2.6 | Data analysis

Descriptive statistics were performed to summarize sample characteristics and the violent event types and severities. Each ABRAT-ED item

and violent events were recoded as dichotomous variables. Pearson's chi-squared procedures were employed to compare the percentage of patients who experienced one or more violent events among the patients in three study periods. Bivariate Kendall's tau correlations were performed to identify the statistically significant variables that correlated with violent events. Those statistically significant variables were then entered into a multivariate logistic regression procedure to determine the predictors of the violent events. All the data were analyzed using SPSS version 29.0 (IBM Corporation), and the significance level was set at p -value <0.05 . Beyond the primary outcomes, no adjustments were made for multiple statistical tests in this non-randomized study.

3 | RESULTS

3.1 | Characteristics of study participants

Of 93,498 unique patients visiting the two EDs during the study, 16,074 patients were excluded due to missing ABRAT-ED assessments, resulting in an overall sample size of 77,424 patients (82.8% completion rate). Figure 2 represents the study flow chart and sample size for each period. The average age of the overall population was 46 years, and the majority were female and non-Hispanic White (Table 1). The median acuity level was 3 out of 5, with a lower number indicating higher acuity. The mean ED arrival-to-room time was 25.3 min. The most common ED visit reasons were abdominal pain (11.6%), chest

TABLE 1 Demographic and clinical characteristics of study populations (N = 77,424).

	Baseline (n = 16,159)	Phase 1 (n = 28,464)	Phase 2 (n = 32,801)	Overall (N = 77,424)
Age (years), mean (range)	46 (10–90+)	46 (10–90+)	46 (10–90+)	46 (10–90+)
Male sex	6902 (42.7)	12,405 (43.6)	15,050 (45.9)	34,357 (44.4)
Race				
Non-Hispanic White	10,767 (66.6)	19,778 (69.5)	23,459 (71.5)	54,004 (69.8)
African-American	3175 (19.6)	4679 (16.4)	4661 (14.2)	12,515 (16.2)
Hispanic	1654 (10.2)	3057 (10.7)	3442 (10.5)	8153 (10.5)
Asian/Pacific Islander	199 (1.2)	339 (1.2)	431 (1.3)	969 (1.2)
American Indian	133 (0.8)	244 (0.9)	254 (0.8)	631 (0.8)
Other/unknown	1885 (11.7)	3424 (12.0)	3996 (12.2)	9305 (12.0)
Acuity level ^a , median (IQR)	3 (2–3)	3 (2–3)	3 (2–3)	3 (2–3)
ED arrival-to-room time, (min.) mean (range)	25.4 (0–1476)	25.7 (0–376)	24.9 (0–1461)	25.3 (0–1476)
ED visit reason				
Non-mental health conditions				
Abdominal pain	1786 (11.1)	3396 (11.9)	3792 (11.6)	8974 (11.6)
Chest pain	1164 (7.2)	2227 (7.8)	2379 (7.3)	5770 (7.5)
Difficulty breathing/ SOB/cough	1405 (8.7)	2062 (7.2)	1639 (5.0)	5106 (6.6)
Fall	766 (4.7)	1398 (4.9)	1672 (5.1)	3836 (5.0)
Back pain/injury	500 (3.1)	817 (2.9)	967 (2.9)	2284 (2.9)
Headache	450 (2.8)	780 (2.7)	894 (2.7)	2124 (2.7)
Motor vehicle/cycle/pedestrian crash	334 (2.1)	636 (2.2)	1101 (3.4)	2071 (2.7)
Leg/hip pain	373 (2.3)	683 (2.4)	808 (2.5)	1864 (2.4)
Dizziness	345 (2.1)	592 (2.1)	779 (2.4)	1716 (2.2)
Flank pain	337 (2.1)	604 (2.1)	700 (2.1)	1641 (2.1)
Wound/laceration/rib pain/assault victim	265 (1.6)	598 (2.1)	685 (2.1)	1431 (1.8)
Probable mental health conditions				
Suicidal ideation/suicide attempt	249 (1.5)	397 (1.4)	320 (1.0)	966 (1.2)
Altered mental status/confusion/delusion	222 (1.4)	369 (1.3)	347 (1.1)	938 (1.2)
Ingestion	104 (0.6)	167 (0.6)	174 (0.5)	445 (0.6)
Alcohol intoxication/problem/DT	118 (0.7)	158 (0.6)	160 (0.5)	436 (0.6)
Psychiatric evaluation	70 (0.4)	121 (0.4)	118 (0.4)	309 (0.4)
Behavioral health concern	52 (0.3)	93 (0.3)	103 (0.3)	248 (0.3)
Aggressive behavior	22 (0.1)	34 (0.1)	28 (0.1)	84 (0.1)
Hallucinations	17 (0.1)	37 (0.1)	29 (0.1)	83 (0.1)
Agitation	5 (0.0)	5 (0.0)	7 (0.0)	17 (0.0)
Homicidal	2 (0.0)	5 (0.0)	10 (0.0)	17 (0.0)

Note: Values are expressed as n (%) unless otherwise indicated. Percentages may not add to 100% because of rounding.

Abbreviations: DT, delirium tremens; ED, emergency department; IQR, interquartile range; SOB, shortness of breath.

^aAcuity level of the ED visit: 1, immediate; 2, emergent; 3, urgent; 4, less urgent; and 5, non-urgent.

pain (7.5%), and respiratory problems (6.6%). In contrast, the fraction of patients with mental health conditions as the ED visit reasons, such as suicide ideation/attempt, was relatively small at 1.2% in the overall population. The demographic and clinical characteristics of the patients were similar across the three groups.

Table 2 describes the sample characteristics of the patients who experienced violent events. Of 77,424 patients, 546 had ≥ 1 violent event, including physical assault, physical threat, sexual harassment, verbal threat, and verbal abuse (overall violent event rate = 0.71%). The mean age was 37 years (95% confidence interval [CI]: 12–75),

TABLE 2 Demographic and clinical characteristics of patients with violent events ($n = 546$).

	Baseline ($n = 150$)	Phase 1 ($n = 192$)	Phase 2 ($n = 204$)	Overall ($n = 546$)
Age (years), mean (range)	36 (10–89)	37 (10–90+)	36 (10–83)	37 (10–90+)
Male sex	83 (55.3)	118 (61.5)	134 (65.7)	335 (61.4)
Race				
Non-Hispanic White	98 (65.3)	120 (62.5)	133 (65.2)	351 (64.3)
African-American	32 (21.3)	42 (22.4)	46 (22.5)	121 (22.3)
Hispanic	14 (9.3)	12 (6.3)	10 (4.9)	36 (6.6)
Asian/Pacific Islander	1 (0.7)	1 (0.5)	1 (0.5)	3 (0.5)
American Indian	2 (1.3)	0 (0)	2 (1.0)	4 (0.7)
Other/unknown	17 (11.3)	28 (14.6)	22 (10.8)	67 (12.3)
Acuity level ^a , median (IQR)	3 (2–3)	3 (2–3)	3 (2–3)	3 (2–3)
ED arrival-to-room time, (min.) mean (range)	10.9 (0–133)	10.0 (0–203)	11.2 (0–209)	10.7 (0–209)
ED visit reason				
Non-mental health conditions				
Abdominal pain	5 (3.3)	5 (2.6)	1 (0.5)	11 (2.0)
Chest pain	5 (3.3)	4 (2.1)	1 (0.5)	10 (1.8)
Difficulty breathing/SOB/cough	5 (3.3)	3 (1.6)	1 (0.5)	9 (1.6)
Fall	3 (2.0)	9 (4.7)	4 (2.0)	16 (2.9)
Back pain/injury	4 (2.7)	3 (1.6)	4 (2.0)	11 (2.0)
Headache	0 (0)	2 (1.0)	1 (0.5)	3 (0.5)
Motor vehicle/cycle/pedestrian crash	1 (0.7)	5 (2.6)	4 (2.0)	10 (1.8)
Leg/hip pain	2 (1.3)	3 (1.6)	4 (2.0)	9 (1.6)
Flank pain	0 (0)	0 (0)	2 (1.0)	2 (0.4)
Wound/laceration/rib pain/assault victim	3 (2.0)	4 (2.1)	8 (3.9)	15 (2.7)
Probable mental health conditions				
Suicidal ideation/suicide attempt	18 (12.0)	23 (12.0)	28 (13.7)	69 (12.6)
Altered mental status/confusion/delusion	7 (4.7)	12 (6.3)	12 (5.9)	31 (5.7)
Ingestion	6 (4.0)	7 (3.6)	8 (3.9)	21 (3.8)
Alcohol intoxication/problem/DT	5 (3.3)	7 (3.6)	9 (4.4)	21 (3.8)
Psychiatric evaluation	9 (6.0)	13 (6.8)	23 (11.3)	45 (8.2)
Behavioral health concern	15 (10.0)	17 (8.9)	23 (11.3)	55 (10.1)
Aggressive behavior	17 (11.3)	23 (12.0)	17 (8.3)	57 (10.4)
Hallucinations	3 (2.0)	2 (1.0)	1 (0.5)	6 (1.1)
Agitation	0 (0)	2 (1.0)	2 (1.0)	4 (0.7)
Homicidal	0 (0)	3 (1.6)	9 (4.4)	12 (2.2)

Note: Values are expressed as n (%) unless otherwise indicated. Percentages may not add to 100% because of rounding.

Abbreviations: DT, delirium tremens; ED, emergency department; IQR, interquartile range; SOB, shortness of breath.

^aAcuity level: 1, immediate; 2, emergent; 3, urgent; 4, less urgent; and 5, non-urgent.

compared to 46 years (95% CI: 14–84) for the overall population. The majority of violent patients were male (61.4%) and non-Hispanic White (64.3%). The ED arrival-to-room time was shorter than that of the overall population (10.7 min vs. 25.3 min), indicating the urgency of the visit. The most common reasons for ED visits among patients with violent events were suicidal ideation/suicide attempt (12.6%), aggressive behavior (10.4%), and behavioral health concerns (10.1%). In contrast, for the overall population, the percentages with these reasons for ED visits were only 1.2%, 0.1%, and 0.3%, respectively (Table 1).

3.2 | Effects of signage and BERT

Figure 3 depicts the violent event rates in each period. The rates were 0.93% for baseline (150 out of 16,159), 0.67% for phase 1 (192 out of 28,464), and 0.62% for phase 2 (204 out of 32,801). In phase 1, compared to the baseline, the relative risk (RR) of violent events was 0.73 (95% CI: 0.59–0.90; $p = 0.003$), and the absolute risk reduction was 0.25% for 28,464 patients in phase 1. However, the addition of the proactive BERT huddle in phase 2 did not reduce the violent events

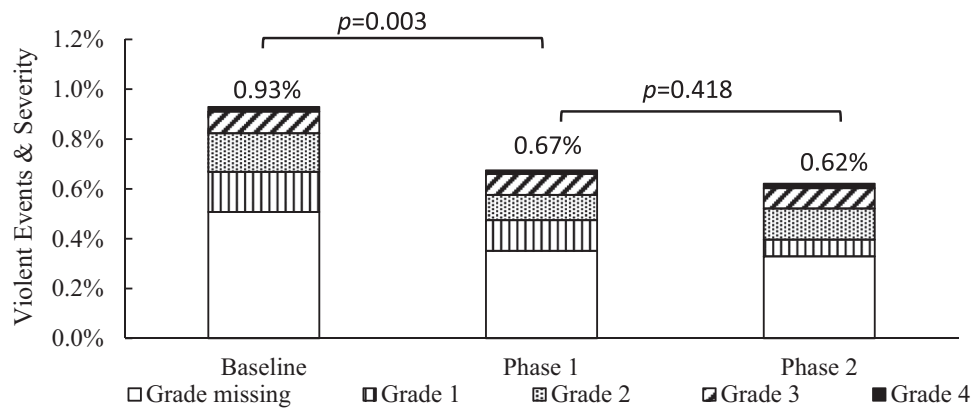


FIGURE 3 Violent event rates and severity grades. Note: The relative risk (RR) of violent events for the phase 1 signage posting intervention compared to the baseline was 0.73 (95% confidence interval [CI]: 0.59–0.90; $p = 0.003$). The RR for the phase 2 signage posting plus proactive Behavioral Emergency Response Team huddle intervention compared to phase 1 was 0.92 (95% CI: 0.76–1.12; $p = 0.418$).

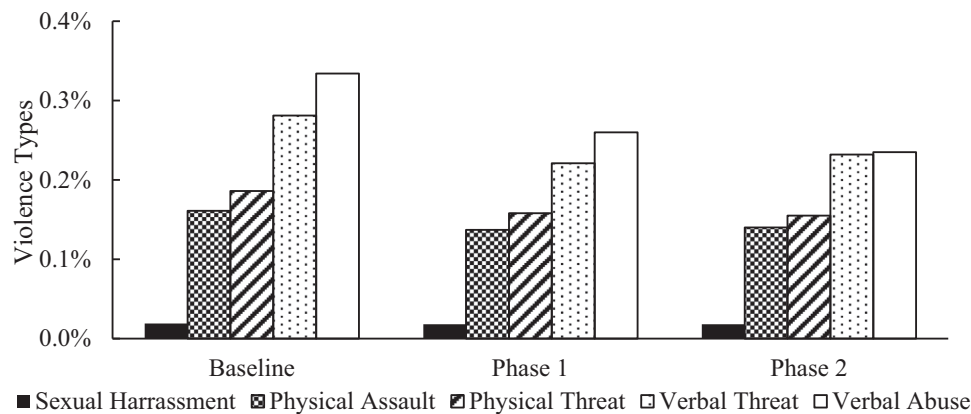


FIGURE 4 Violent event types.

compared to the signage posting alone (RR = 0.92; 95% CI: 0.76–1.12; $p = 0.418$).

Figure 3 also shows the distribution of violent event severities. Although approximately half of the severity grades were not collected, all severity grades decreased numerically during phase 1 compared to the baseline, consistent with the decrease in the overall violent event rate. The incidence of each violence type was numerically reduced in phase 1 compared to the baseline (Figure 4).

3.3 | Predictors of patients with violent events

The bivariate Kendall tau correlations showed that males, African-Americans, and ABRAT-ED scores ≥ 5 had positive associations with violent events (Table 3). In contrast, age ≥ 70 years, White and Hispanic race, signage posting intervention, as well as signage posting combined with proactive BERT huddle were negatively associated with violent events. These eight significant variables were entered into the multivariate logistic regression procedure to determine the independent predictors of violent events (Table 4). The positive predictors were males (odds ratio [OR] = 1.68; $p < 0.001$), African-Americans

(OR = 1.39; $p = 0.007$), and ABRAT-ED scores ≥ 5 (OR = 1.89; $p < 0.001$). The negative predictors were age ≥ 70 years (OR = 0.63; $p = 0.008$), and signage posting intervention (OR = 0.78; $p = 0.022$).

4 | LIMITATIONS

There are several limitations to this study. First, although the patient characteristics appeared to be similar across the three periods in the study, the non-randomized study design may have introduced bias due to unmeasured confounding variables, including ED census data, prevalence of respiratory viruses in the community, and staffing difficulties. Therefore, the findings from this study need to be confirmed in a randomized controlled study. Second, the compliance of signage posting or proactive BERT huddle for patients with ABRAT-ED scores ≥ 5 was not collected in the EHRs. Hence, the exact compliance rates of the interventions are unknown. In addition, most of the ED staff have been trained in managing patients with violent behavior, and it is possible that the staff may have started implementing some of the BERT huddle behaviors when the sign was posted, which could have decreased the effects of the phase 2 intervention. Third, this stepwise interven-

TABLE 3 Bivariate correlations with violent events (N = 77,424).

Variables	r
Age ≥70 years	-0.024***
Male sex	0.029***
Race	
Non-Hispanic White	-0.010**
African-American	0.014***
Hispanic	-0.011**
ABRAT-ED scores ≥5	0.465***
Intervention: signage posting	-0.014***
Intervention: signage posting + proactive BERT huddle	-0.009*

Note: r denotes Kendall's tau correlation coefficient.

Abbreviations: ABRAT-ED, Aggressive Behavior Risk Assessment Tool for emergency departments; BERT, Behavioral Emergency Response Team.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

TABLE 4 Multivariate logistic regression model for predicting patients with violent events (N = 77,424).

Predictors	OR	95% CI	p-Value
Age ≥70 years	0.63	0.45–0.89	0.008
Male sex	1.68	1.38–2.04	<0.001
African-American	1.39	1.10–1.76	0.007
ABRAT-ED scores ≥5	189	155–230	<0.001
Intervention: signage posting	0.78	0.62–0.96	0.022

Abbreviations: ABRAT-ED, Aggressive Behavior Risk Assessment Tool for emergency departments; CI, confidence interval; OR, odds ratio.

tional study only examined the effect of proactive BERT huddle plus signage posting compared to the signage posting alone; therefore, the effect of the proactive BERT alone compared to the baseline could not be determined. Fourth, despite the large overall sample size of 77,424 patients, the actual number of patients with violent events was relatively small, which precluded subset analyses of various violent event types. Because of concurrent utilization of the pre-existing violent event data collection method without severity information along with the new VEST collection method with severity data collection, about half of the severity grades were not recorded, which hindered examining the effect of interventions on the severity of the violent events. Fifth, although we expected more than 17.2% missing ABRAT-ED data, it still could have biased the results. Finally, this study was conducted in one geographical location, so the findings may not be generalizable to other sites.

5 | DISCUSSION

The use of ABRAT-ED as a violence risk screening tool and posting visual signages for high-risk patients showed a significant reduction in

patient violence. The RR of violent events was reduced by one-quarter with the signage posting intervention compared to the baseline. This reduction in violent events was further substantiated by the multivariate analysis showing that signage posting was a negative predictor, with significant lower odds of violent events. Simply posting signage for the small subset of high-risk patients identified by the ABRAT-ED appears to be a cost-effective strategy for WPV prevention in EDs. The signage posting was designed to increase situational awareness of the staff regarding the patients at elevated risk of violence. In contrast to the electronic flagging that is only visible to staff while accessing the EHRs, posting signage at the bedside or doorway may serve as a more persistent reminder and induce a superior situational awareness for all staff approaching high-risk patients.^{23,25} Indeed, a brief survey of the ED staff showed that almost all agreed or strongly agreed that the signage posting increased their awareness of patients at risk of violence. In addition, all used one or more violence risk management approaches, such as using calm and soothing speech, avoiding sudden movements, keeping close to an exit path, and planning to de-escalate.

Surprisingly, adding the proactive BERT huddle to the signage posting showed no significant reduction in violent events compared to the signage posting alone as a primary preventive measure. It is possible that some of the BERT huddles did not occur in a timely fashion to prevent violent events because it is a resource-intensive endeavor in busy EDs. Previous studies reported positive effects of BERT or similar behavioral response interventions in EDs. However, a pragmatic cluster cross-over trial in a hospital setting showed that a proactive implementation of a behavioral intervention team for high-risk patients did not reduce aggressive events.²⁶ The main focus of most behavioral response interventions was de-escalation training for use during or after violent events rather than violence prevention before the violent events.^{15,22} In the current stepwise interventional study design, examining the effect of proactive BERT intervention without signage was not possible.

Multivariate logistic regression procedure also showed that the ABRAT-ED scores ≥5 were associated with very high odds of violent events, further substantiating the utility of the ABRAT-ED as a screening tool. The combined use of ABRAT-ED and signage posting as an effective violence reduction strategy for the small subset of high-risk patients further suggests that universal violence precaution, that is, treating every patient as potentially violent, may not be the optimal approach. Indiscriminately regarding every patient in the ED as a potential perpetrator of violence would not only dilute preventive efforts but also inhibit the establishment of a patient-provider therapeutic alliance.^{10,11} The universal precaution may further contribute to anxiety and burnout among ED staff.

In the current study, the violent event rate was 0.93% at baseline, indicating that slightly less than one out of 100 ED patients exhibited violent behavior before the implementation of preventive measures. This violent event rate is consistent with previous studies that reported rates of 1.2% or 1.7%.^{8,27} These low percentages of ED patients exhibiting violent behaviors appear to conflict with the high percentages of ED staff experiencing violence. However, the percentages are based on two different units of measure: the former is based

on every 100 ED patients, whereas the latter is based on every 100 ED staff. The high percentage of ED staff experiencing violence is likely related to the large number of ED patients seen by each staff member. This may also be related to the multiple people involved in the care of each patient with violent behaviors.

In addition to ABRAT-ED, the VEST was used as a standardized tool to collect both types and severities of violent events in a more objective manner. During the study implementation, the EDs were in the process of adopting the VEST as the standard violence collection tool, and the pre-existing method was still being used in parallel. This may have contributed to the missing severity grades in about half of the violent events throughout the study. Following the completion of the current study, the pre-existing collection method was discontinued, and only VEST is currently being used to collect violence data.

In conclusion, to our knowledge, this is the first study that showed a significant decrease in patient violence through the use of a screening tool to identify high-risk patients, followed by a targeted intervention of proactive signage posting. Although using ABRAT-ED to screen patients and posting signage for high-risk patients are relatively inexpensive strategies compared to the costs of proactive BERT intervention or that arising from WPV, further studies are needed to confirm the results of the current study findings.

AUTHOR CONTRIBUTIONS

Son Chae Kim and Jennifer Kaiser conceived and designed the study. Tracy Hosford, Carol Sadate-Akhavi, Ashleigh Nurski, Thomas Bos, and Chelsea Ciampa contributed to the study design. Jennifer Kaiser, Tracy Hosford, Carol Sadate-Akhavi, Ashleigh Nurski, Thomas Bos, and Chelsea Ciampa contributed to the data collection. Son Chae Kim performed the statistical analysis and interpretation. Son Chae Kim drafted the manuscript, and all the authors contributed to reviewing and editing the final draft.

CONFLICT OF INTEREST STATEMENT

Son Chae Kim is a copyright holder of the ABRAT-ED and VEST. The remaining authors declare they have no conflicts of interest.

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REFERENCES

1. The Joint Commission. *Workplace Violence Prevention Standards*. R3 Report Issue 30. 2021. Accessed January 3, 2023. <https://www.jointcommission.org/standards/r3-report/r3-report-issue-30-workplace-violence-prevention-standards/>
2. Press Ganey's National Database of Nursing Quality Indicators (NDNQI). *On Average, Two Nurses are Assaulted Every Hour*. 2022. Accessed May 20, 2023. <https://www.pressganey.com/news/on-average-two-nurses-are-assaulted-every-hour-new-press-ganey-analysis-finds/>
3. American College of Emergency Physicians. *ACEP Emergency Department Violence Poll Results*. 2022. Accessed January 20, 2024. <https://www.emergencyphysicians.org/siteassets/emphysicians/all-pdfs/acep-emergency-department-violence-report-2022-abridged.pdf>
4. Centers for Medicare & Medicaid Services/Center for Clinical Standards and Quality. *Memorandum, Workplace Violence—Hospitals*. Ref: QSO-23-Hospitals. 2022. Accessed June 3, 2023. <https://www.cms.gov/files/document/qso-23-04-hospitals.pdf>
5. Occupational Safety and Health Administration. *Report of the Small Business Advocacy Review Panel on OSHA's Potential Standard for Prevention of Workplace Violence in Healthcare and Social Assistance*. 2023. Accessed June 3, 2023. <https://www.osha.gov/sites/default/files/OSHA-WPV-SBAR-Panel-Report.pdf>
6. State of California Department of Industrial Relations. *Workplace Violence Prevention in Health Care*. 2017. Accessed June 30, 2023. <https://www.dir.ca.gov/dosh/workplace-violence-prevention-in-healthcare.html>
7. Odes R, Chapman S, Ackerman S, Harrison R, Hong O. Differences in hospitals' workplace violence incident reporting practices: a Mixed Methods Study. *Policy Polit Nurs Pract*. 2022;23(2):98-108.
8. Kim SC, Kim YP. Violent Event Severity Tool for reporting violent incidents. *J Nurs Adm*. 2023;53(12):648-653.
9. Kim SC, Kaiser J, Bulson J, et al. Multisite study of Aggressive Behavior Risk Assessment Tool in emergency departments. *J Am Coll Emerg Physicians Open*. 2022;3(2):e12693.
10. Gillespie GL, Tamsukhin S. Why won't it stop: workplace violence in emergency care. *J Emerg Nurs*. 2023;49(3):310-316.
11. Occupational Safety and Health Administration. *Guidelines for Preventing Workplace Violence for Healthcare and Social Service Workers*. OSHA 3148-06R. 2016. Accessed September 14, 2021. <https://www.osha.gov/sites/default/files/publications/osha3148.pdf>
12. Wirth T, Peters C, Nienhaus A, Schablon A. Interventions for workplace violence prevention in emergency departments: a systematic review. *Int J Environ Res Public Health*. 2021;18(16):8459.
13. Gates D, Gillespie G, Smith C, Rode J, Kowalenko T, Smith B. Using action research to plan a violence prevention program for emergency departments. *J Emerg Nurs*. 2011;37(1):32-39.
14. Doehring MC, Curtice H, Hunter BR, et al. Exploring verbal and physical workplace violence in a large, urban emergency department. *Am J Emerg Med*. 2023;67:1-4.
15. Zicko CJM, Schroeder LRA, Byers CWS, Taylor LAM, Spence CDL. Behavioral Emergency Response Team: implementation improves patient safety, staff safety, and staff collaboration. *Worldviews Evid Based Nurs*. 2017;14(5):377-384.
16. Rajwani A, Clark N, Montalvo C. Understanding best practices in implementation of Behavioral Emergency Response Teams through a scoping review. *J Am Psychiatr Nurses Assoc*. 2023;29(5):375-388.
17. Roppolo LP, Morris DW, Khan F, et al. Improving the management of acutely agitated patients in the emergency department through implementation of Project BETA (Best Practices in the Evaluation and Treatment of Agitation). *J Am Coll Emerg Physicians Open*. 2020;1(5):898-907.
18. Moore C, Damari N, Liles EA, Bramson B. Who you gonna call? Outcomes of a team-based approach to respond to disruptive behavioral issues in hospitalized patients. *Jt Comm J Qual Patient Saf*. 2019;45(11):781-785.
19. Pierre PE, Loeb SJ, Bransby KA. Evaluating a Behavioral Response Team in an acute care hospital. *Medsurg Nurs*. 2023;32(1):46-51.
20. Gerson R, Malas N, Feuer V, Silver GH, Prasad R, Mroczkowski MM. Best Practices for Evaluation and Treatment of Agitated Children and Adolescents (BETA) in the emergency department: consensus statement of the American Association for Emergency Psychiatry. *Focus (Am Psychiatr Publ)*. 2023;21(1):80-88.
21. Choi KR, Omerly AK, Watkins AM. An integrative literature review of psychiatric Rapid Response Teams and their implementation for de-

- escalating behavioral crises in nonpsychiatric hospital settings. *J Nurs Adm.* 2019;49(6):297-302.
22. Bruccoli AM. Implementation of a Behavioral Emergency Response Team in the emergency department. *J Emerg Nurs.* 2023;49(3):395-402.
 23. Okundolor SI, Ahenkorah F, Sarff L, et al. Zero staff assaults in the psychiatric emergency room: impact of a multifaceted performance improvement project. *J Am Psychiatr Nurses Assoc.* 2021;27(1):64-71.
 24. Turgut K, Yavuz E, Yildiz MK, Poyraz MK. Violence toward emergency physicians: a prospective-descriptive study. *World J Emerg Med.* 2021;12(2):111-116.
 25. Ferron EM, Kosny A, Tonima S. Workplace violence prevention: flagging practices and challenges in hospitals. *Workplace Health Saf.* 2022;70(3):126-135.
 26. Hasselblad M, Morrison J, Kleinpell R, et al. Promoting patient and nurse safety: testing a behavioural health intervention in a learning healthcare system: results of the Demeanor pragmatic, cluster, cross-over trial. *BMJ Open Qual.* 2022;11(1):e001315.
 27. Partridge B, Affleck J. Predicting aggressive patient behaviour in a hospital emergency department: an empirical study of security officers using the Broset Violence Checklist. *Australas Emerg Care.* 2018;21(1):31-35.

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