Effectiveness of De-escalation Training and Workplace Violence Prevention Interventions for Healthcare Workers in Emergency Departments: A Systematic Review

Tripti Chopra[1] **Punit Kakrecha**[2]

[1]Independent Researcher, ThePhdCoach
[2] Independent Researcher, ThePhdCoach

Abstract

Background. One area in health care that is recognized as having a high risk of violence from patients and visitors is the emergency department. The damage to staff has led to significant investment in de-escalation training, as well as wider workplace violence prevention programmes. Whether this investment has any real impact on staff readiness, or more significantly, on the number of violent incidents, is yet to be seen, however. This review focused on interventions provided at an ED level to prevent or manage violence by patients/visitors by ED health-care professionals.

Methods. Six electronic databases (MEDLINE, Embase, CINAHL, PsycINFO, Cochrane CENTRAL and Web of Science) were searched from January 2010 to March 2022 for studies that assessed de-escalation training or broader workplace violence prevention interventions among healthcare workers in hospital emergency departments, with citation searching also undertaken. Staff knowledge, skills, confidence, or attitudes and the frequency or severity of violence incidents were the eligible outcomes. Records were independently screened and the methodological quality was appraised by two reviewers using the Joanna Briggs Institute critical appraisal checklists and the Mixed Methods Appraisal Tool. Due to the heterogenous interventions, outcome measures and study designs, the results were narratively synthesized and summarized in an effect-direction plot.

Results. Seventeen studies were included. The majority were quasi-experimental, and they were conducted in the U.S. Thirteen studies assessed the effectiveness of behavioral interventions that were (online only, classroom only, simulation only or hybrid), and four studies integrated organizational and environmental interventions with training. Training reinforced knowledge test scores and self-

reported confidence, at least in the short-term, while very short training sessions (5 to 45 minutes) had little or no impact on attitudes. There was less robust evidence about the frequency of violent incidents. In the one single controlled evaluation of a multicomponent programme, there was a reduction in assaults in both intervention and comparison areas, with reported gains fading within months unless refreshed. High methodological quality was only achieved with 2 studies.

Conclusions. De-escalation training is consistently effective in enhancing knowledge and confidence among emergency department staff, however evidence of the effectiveness of this training on the incidence of assaults is limited in duration and not often collected through controlled designs. Environmental and organizational measures that focus on the conditions that lead to the occurrence of violence are least evaluated. Studies with incident outcomes and long follow-up (more than a few months) that are adequately controlled are needed.

Key words: Workplace violence; De-escalation; Emergency department; Health personnel; Occupational safety; Aggression management; Patient and visitor violence; Systematic review.

Background

Bullying by patients and their relatives is now commonplace amongst the occupational hazards of working in the emergency department. Liu et al. estimated in the largest synthesis to date that in emergency situations, about 31% of health workers suffered physical violence and 62% suffered non-physical violence (which includes threats, verbal abuse, and intimidation) in the previous 12 months [1]. A meta-analysis with a specific focus on emergency departments found similar estimates and suggested that the amount of exposure has been rising, rather than levelling off overtime [2]. The COVID-19 pandemic seems to have exacerbated this trend, as violence against health workers, particularly against frontline and emergency workers, increased during period [3]. Nurses are most likely to be exposed because they spend the most time with patients [4].

There are several characteristics to emergency service that add to the likelihood of aggression. Patients often arrive in pain, distress or acute illness and may be intoxicated or cognitively impaired; intoxication, stimulant use and acute mental illness are common patient risk factors [5]. Crowding and extended waiting times increase tensions and night shifts, lone working and communication

problems between staff and patients increase risks [6]. The emergency department is also an open and accessible space by design, which helps patients be cared for, but makes it difficult to keep patients and staff secure.

The impacts of this violence are felt both on individuals and organizations. Employees who have been physically or verbally assaulted report having sleep difficulties, feeling anxious and angry, and some report feeling socially withdrawn and experiencing a decrease in job quality of life, which are strongly related to their sense of safety on the job [7]. Emergency clinicians may be more prone to stress or stress disorders because of work-related violence [8]. At the organizational level, it is linked to lost productivity, higher absenteeism and higher intentions to leave, and thus contributes to a high cost of attrition in already strained workplaces [9]. The need for intervention is thus not an issue; what are the interventions and are they effective?

International guidance refers to three levels of prevention: environmental measures: controlled access, clear sight lines, alarm systems, calmer waiting areas; organizational measures: adequate staffing, visitor policy, reporting and risk flagging; behavior: training staff to recognize and defuse escalating situations [10]. De-escalation is a behavioral level process. In a concept analysis, Hallett and Dickens described it as a process of gradually decreasing the agitation and risk of a person becoming aggressive through the use of verbal and non-verbal communication with others [11]. The logic behind this is clear: It is generally less expensive, less coercive and is designed to prevent harm that requires restraint or a security response.

Overall, there have been cautious conclusions in the reviews in health care. Geoffrion and colleagues rated the certainty of the evidence for education and training as low to very low for an effect on aggression in their Cochrane review [12]. In the review by Somani et al., interventions for de-escalation of violence against nurses were found to mainly be based on uncontrolled designs and trainings increased knowledge and skills [13]. A similar conclusion was drawn in the field of forensic psychiatry [14]. Two reviews have focused specifically on emergency departments, one by Wirth and collaborators in 2021 found that the majority of studies report positive results, but the evidence base remains low level, methodologically weak and outcomes are self-reported, and short-term in nature [15, 16]. Emergency nurses conducted a cluster-randomized trial [17] and simulation-based

programmes [18] have been developed since these syntheses were undertaken and should be re-evaluated.

This review updates and refines the evidence for EDs. Its goals were to identify the interventions evaluated with emergency department staff and to categorize them based on whether the intervention was stand-alone training or a multicomponent programme; to appraise the effectiveness of the interventions on two types of outcome, what emergency department staff know and what emergency department staff feel able to do; and to evaluate the strength of the evidence supporting each. This second distinction is central, as an intervention can increase confidence without decreasing the number of assaults, and the literatures have shown a tendency to "mix" these outcomes and thus overestimate the effectiveness.

Methods

Protocol and reporting

The review was performed and reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) statement [19]. The eligibility criteria and search strategy were determined prior to screening. This is acknowledged as a limitation as the protocol was not prospectively registered.

Eligibility criteria

Studies were excluded based on a PICOS framework (Table 1). No language restriction was observed, and the necessity of a control group was not imposed, which meant that pre/post and uncontrolled evaluations were accepted as well as controlled evaluations.

Table 1 Eligibility criteria (PICOS)

Element	Included	Excluded
Population	Healthcare workers (nurses, physicians, allied and support staff, trainees) in hospital emergency departments	Non-ED settings, or mixed settings not disaggregated

Intervention	De-escalation training or wider workplace violence prevention, behavioral (online, classroom, simulation, hybrid), organizational or environmental; targeting patient/visitor violence	Interventions concerned only with restraint, sedation, documentation or post-incident treatment
Comparator	Any or none (controlled, pre/post, or single group)	-
Outcomes	Staff knowledge; skills/competence; confidence, self-efficacy or attitudes; frequency or severity of violent incidents	Patient-only clinical outcomes; worker-on-worker violence
Study design	Experimental, quasi-experimental, observational (cohort, cross-sectional, interrupted time series) and mixed-methods studies with a quantitative evaluation component	Reviews, protocols, editorials, case reports, conference abstracts, theses
Dates / language	January 2010 to March 2022; no language restriction	-

ED, emergency department. PICOS: Population, Intervention, Comparator, Outcome, Study design.

Search strategy

Six electronic databases were searched: MEDLINE (via PubMed), Embase, CINAHL, PsycINFO, Cochrane CENTRAL and the Web of Science Core Collection. The strategy included a combination of controlled vocabulary and free-text terms in four concept blocks: the population and occupation, the emergency-department setting, the exposure (violence and aggression), and the intervention (training, education and prevention). Key papers were forward cited, and reference lists of included studies and relevant reviews were hand-searched. A sample MEDLINE search string is given in Appendix.

Study selection and data extraction

Records were de-duplicated using a reference manager. Titles and abstracts were independently screened by two reviewers and subsequently full texts by two reviewers against the eligibility criteria, with disagreements confirmed by a third reviewer if needed. One reviewer extracted the data on a standardized form, which was double checked by a second reviewer, and included author, year, country, design, setting, sample, intervention content, intervention format and dose, comparator, follow-up period and outcomes with results.

Quality appraisal and synthesis

The Joanna Briggs Institute critical appraisal checklists for quasi-experimental studies, prevalence/cross sectional studies [20, 21] and the Mixed Methods Appraisal Tool for mixed methods designs [22] were used to assess methodological quality. The scoring of these studies was independent, and each appraiser categorized the studies as low, moderate or high quality. Quality was not used as a criterion for exclusion in the study but was included in the interpretation. Due to the lack of the homogeneity of interventions, outcome measures and designs, the results were narratively synthesized, sorted by the type of intervention and outcome domain, and the direction and statistical significance of effects were summarized across study quality in an effect-direction plot (Figure 2).

Use of AI-assisted tools

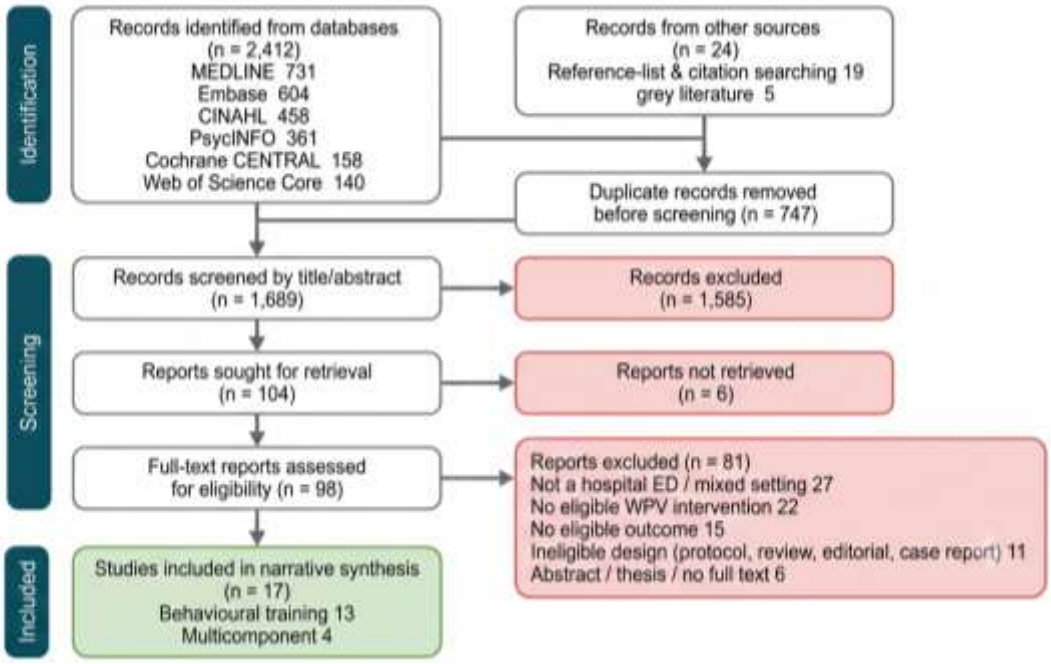
Large language models were used for language editing and drafting. The data extraction, interpretation and referencing were verified by authors, and they accept full responsibility of the data in line with the authorship policy of the journal.

Results

Study selection

A search was conducted which resulted in 2,412 database records and 24 records from other sources being found. A total of 104 full texts were retrieved and 98 were assessed for eligibility after removal of 747 duplicates and screening of 1,689 records. A total of 17 studies fulfilled all the criteria and were included in the synthesis (Figure 1).

Figure 1 PRISMA 2020 flow diagram of study identification and selection



WPV, workplace violence; ED, emergency department.

Characteristics of included studies

Twelve studies were performed in the U.S., two in Australia, two in France, and one in Germany and Taiwan. Most of the designs were quasi-experimental with pre/post testing; one cluster-randomized controlled trial [17] and one interrupted time series were also included as were three cross-sectional and one observational quality-improvement studies. The number of participants in the samples varied from 11 to 471 participants. Thirteen studies assessed only the effects of behavioral training, while four studies included a combination with organizational and environmental interventions (Table 2).

Table 2 Characteristics and principal findings of the 17 included studies

Study, country	Design	Setting & sample	Intervention	Main finding(s)	Quality

Ball 2015, USA [23]	Pre/post + comparison	Level I trauma center; 93 medical students	10-min video podcast on violent-person management	Knowledge scores and confidence in responding rose vs untrained group	Moderate
Bataille 2013, France [32]	Cross-sectional	Emergency ICU; 27 staff	Conflict-defusing and self-defense training	High satisfaction; no change measured	Low
Buterakos 2020, USA [29]	Two-phase QI pre/post	Urban ED; 25–34 nurses	5-min in-service + posters on reporting, de-escalation, self-protection	Reporting rose; de-escalation confidence unchanged	Moderate
Chang 2022, Taiwan [17]	Cluster RCT	Hospital ED; 75 nurses	Integrated WPV prevention and management programme vs 1-h class	Self-efficacy, goal commitment, attitudes and confidence improved	High
Frick 2018, Germany [28]	Cross-sectional	Acute care/ED, Charité; 110 staff	Three 8-h days of in-house de-escalation training	High self-rated skills; defense/escape skills rated lower	Moderate

Gerdtz 2013, Australia [30]	Mixed methods, multisite	Public-sector EDs; 471 nurses	45-min rapid training (train-the-trainer)	Attitudes shifted on ~1/5 of items; managers perceived impact	High
Gillam 2014, USA [33]	Observational QI	Tertiary ED; staff	8-h nonviolent crisis-intervention training	Security-response events fell only when training was recent (90–150 d)	Moderate
Gillespie 2012, USA [24]	Quasi-experimental	Three EDs; 315 staff	Web-based ± classroom educational units	Knowledge rose in both arms; no hybrid advantage on knowledge	Moderate
Gillespie 2013, USA [41]	Cross-sectional (action research)	Three EDs; 53 staff	Walk-throughs + policies + online/classroom training	Programme rated moderately beneficial	Low
Gillespie 2014a, USA [34]	Controlled repeated measures	Three EDs + 3 comparison EDs; 209 staff	Comprehensive multicomponent programme	Assaults/threats fell — but also in comparison sites	High

Gillespie 2014b, USA [25]	Repeated measures	Three EDs; 120 staff	Hybrid online + classroom programme	Knowledge gain retained at 6 months	Moderate
Hills 2010, Australia [27]	Pre/post	Rural EDs / mental health; 33–55 clinicians	24-week online learning programme	Perceived self-efficacy in managing aggression rose	Moderate
Krull 2019, USA [26]	Pre/post	ED; 96 interprofessional staff	Computer-based + simulation de-escalation/restraint	Knowledge, skills and confidence rose	Moderate
Okundolor 2021, USA [35]	Pre/post + record review	Psychiatric ER; 42 nursing staff	Multifaceted bundle (drills, briefings, screening, support)	75% fall in assaults; self-efficacy rose	Low
Touzet 2019, France [36]	Interrupted time series	Ophthalmic ED; 30 staff	Triage redesign, signage, mediator, video surveillance	Violent acts fell 24.8→9.5 per 1,000 admissions	Moderate
Wong 2015, USA [31]	Pre/post	ED; 106 staff	Simulation-enhanced interprofessional curriculum	Attitudes improved except clinical management of aggression	Moderate

ED, emergency department; ER, emergency room; ICU, intensive care unit; QI, quality improvement; RCT, randomized controlled trial; WPV, workplace violence. Bracketed numbers are reference-list

citations. Quality banded from JBI / MMAT appraisal. Gillespie 2012–2014 comprise linked reports from overlapping programmes and are treated as distinct evaluations.

Behavioral training: knowledge and skills

In general, training resulted in gains when compared to a knowledge measure. A ten-minute video podcast on violent-person management was able to boost test scores of fourth-year medical students, far above those of an untrained comparison group, found Ball and colleagues [23]. Gillespie et al. reported that staff who completed the online units alone or with the classroom component had significant knowledge gains from a hybrid web-and-classroom programme, and there was no evidence of any difference between these two groups in knowledge gain on the measure of knowledge per se [24]; a linked repeated measures study demonstrated that this knowledge gain remained at 6 months [25]. In a similar manner, both a computer-plus-simulation package [26] and a multidisciplinary simulation programme [18] resulted in an increase in staff-rated knowledge and skills. Remarkable as this is, its meaning is restricted: a higher score on the test immediately after a session means that the material was taken in, but not that an agitated patient will be managed better a few months later.

Behavioral training: confidence, self-efficacy and attitudes

Results for confidence and self-efficacy were much more similar overall and more inconsistent. An online programme consisting of 24 weeks increased nurses' self-efficacy in dealing with aggression [27]. A three-day in-house course resulted in high self-ratings of de-escalation skill and a moderate but significant minority rating their defense and escape skills as only moderate [28]. The methodologically strongest study in this set, conducted by Chang and colleagues, resulted in an increase in occupational coping self-efficacy, goal commitment, attitudes and confidence among emergency nurses compared to a one-hour in-service control [17]. The studies of very short sessions, in contrast, reported little effect. A five-minute in-service on de-escalation and self-protection did not change the attitudes of the nurses in de-escalating an aggressive patient [29] and a 45-minute rapid training changed attitudes in ~20% of the items assessed, but the managers who observed the trained staff perceived a difference [30]. The simulation curriculum wasn't associated with an increase in attitudes in all the areas, but it did have one area of note, which was that it didn't have a positive

impact on attitudes regarding the clinical management of aggression [31]. One short course was assessed as highly satisfactory by the participants but only for satisfaction and did not offer any data on capability [32].

Dose and decay

The results on confidence did show a consistent trend: dose of intervention seemed to be important. Interventions that changed attitudes lasted for hours to weeks, and those that did not change attitudes lasted only for minutes. This finding is supported by the Gillam study where there was a falling trend in the number of violent events that have been responded to by a security guard when a higher percentage of staff had training within the previous 90-150 days, but not when it had been performed before that period [33]. Assuming this effect is strong, the impact of a single training session is not only small, but also short-lived and suggests that training is less a one-off event than a competency that needs periodic refreshing.

Multicomponent programmes and violence incidence

Direct measures of violence (as opposed to staff perceptions of violence) are needed the most and are least common. Four assessed multicomponent programmes. Gillespie et al. reported that a comprehensive programme including environmental walk-throughs, site-specific policies, online and classroom training, was associated with a reduction in physical assaults and threats in the intervention departments but also in the comparison departments that had no intervention. This is a result to be especially circumspect about and is perhaps the most telling in this literature [34]. There were larger reductions reported in two uncontrolled programmes. A package of behavioral-response drills, pre-shift briefings, risk screening and post-incident support recorded 75% fewer assaults in a psychiatric emergency room by Okundolor et al. [35]. A package of triage redesign, signage, a mediator and video surveillance led to a decrease from 24.8 to 9.5 self-reported violent acts per 1,000 admissions in an interrupted time series in a French ophthalmic emergency department [36]. They are positive numbers, but they are associated with poor designs, and the incident reporting system may be different at the same time as the interventions were being taken, which may also have impacted the numbers. There was low rating on appraisal for the Okundolor study and moderate rating for the Touzet study.

Overall, there is some plausible evidence that multicomponent programmes can reduce violence, although no study to date has shown this using an appropriate counterfactual.

Methodological quality

The two studies that rated highly on the self-report outcomes were the multi-site evaluation by Gerdtz and colleagues and the randomized trial by Chang and colleagues, and the 2014 controlled study by Gillespie and colleagues also received a high score on the JBI checklist for the incident outcomes [17, 30, 34]. The rest of the studies were deemed to be moderate or low. Constant weaknesses were the lack of an independent control group, a single post-intervention assessment that can be used to determine durability, and incomplete follow-up as well as outcomes based on non-validated self-report instruments. Figure 2 shows the direction and importance of effects as related to study quality. The visual pattern, in which positive trends are concentrated in the knowledge and confidence columns, and the incident column has fewer findings, and few high-quality ratings are found in any column, captures the key findings of this review.

Figure 2 Effect-direction plot of intervention outcomes across included studies

Figure 2. Effect-direction plot of intervention outcomes across included studies

Study (country)	Knowledge	Confidence / attitudes	Incident rate / severity	Study quality
Ball 2015 (USA)	▲	▲	–	M
Bataille 2013 (FR)	–	–	–	L
Buterakos 2020 (USA)	–	◆	–	M
Chang 2022 (TW) †	–	▲	–	H
Duncan 2024 (USA)	▲	▲	–	M
Frick 2018 (DE)	–	▲	–	M
Gerdtz 2013 (AU)	–	◆	–	H
Gillam 2014 (USA)	–	–	▲	M
Gillespie 2012 (USA)	▲	–	–	M
Gillespie 2013 (USA)	–	◆	–	L
Gillespie 2014a (USA)	–	–	◆	H
Gillespie 2014b (USA)	▲	–	–	M
Hills 2010 (AU)	–	▲	–	M
Krull 2019 (USA)	▲	▲	–	M
Okundolor 2021 (USA)	–	▲	▲	L
Touzet 2019 (FR)	–	–	▲	M
Wong 2015 (USA)	–	▲	–	M

▲ favourable, statistically significant effect ◆ mixed / non-significant – not assessed
Study quality: H high M moderate L low (JBI / MMAT appraisal) † randomised controlled trial

Each row is a study; columns are outcome domains. Upward triangle, favorable statistically significant effect; diamond, mixed or non-significant; dash, not assessed. Colored circle denotes study quality (H high, M moderate, L low). Randomized controlled trial.

Discussion

From this review two findings can be made. In the first instance, training ED personnel in de-escalation and violence prevention has proven to enhance their knowledge and confidence. Second, there is no clear evidence to date that impacts on the frequency of violence is well-established or independent of what would have happened in the absence of intervention on the best evidence available. These two conclusions constitute the practical gap where the questions lie.

Why confidence rises without incidents falling

This discrepancy can be accounted for by several mechanisms. The trained person is assessed for both their confidence and knowledge immediately after the intervention with instruments which are sensitive to the content taught. Incident rates, on the other hand, are a characteristic of the entire department over a period of months and are influenced not only by the particular technique used by each clinician but also by the degree of crowding, staffing, case-mix and reporting culture. Even if a nurse is better at defusing, they can be assaulted more often due to a busier department. This supports Anderson et al.'s claim that training is not enough to address organizational and environmental issues and the evidence from the emergency department continues to support this [37]. It also helps to explain the Gillespie result: even in a controlled pre/post design, a secular reduction in violence in a health system may be mistakenly attributed to the intervention, when it is not responsible [34].

The reporting paradox

Another type of measurement problem needs to be addressed. There were several interventions that specifically supported incident reporting [29, 35]. A partly reporting based programme will show an increase in violence for a while as it improves the culture of reporting, whereas a self-reporting-based programme will show a decrease, but it may be actually reporting fatigue and not a decrease in actual violence. The findings for incidents in this field should be interpreted with this caveat until such studies use outcomes that are less subject to bias than voluntary reports, like FBI security activation, injury records, or validated observational scales like the Staff Observation Aggression Scale–Revised.

How this sits with the wider evidence

In general, the findings of this review are similar to those found in the other literature which is informative. The Cochrane review rated the evidence for training in all health-care settings as low certainty [12] and reviews in forensic psychiatry and general nursing similarly reported that knowledge and skills gains were sparse and primarily based on weak designs [13, 14]; and the two previous emergency department reviews came to the same conclusions of sparse but generally positive evidence [15, 16]. But the fact that four independent syntheses come up at different places indicates that the faulty study or the overlooked study has not yet been done, but rather that the well-controlled study in which the outcomes were clearly related to the incidents and in which there was meaningful follow-up has generally not been done.

Implications for practice

With departments where there are limited resources, there are several defensible positions that the evidence supports. Training is worthwhile: low cost, low risk, increase preparedness and is valued by staff. It should be presented, though, as learning and practice and not as protection from assault (for good), and a series of short token sessions will not necessarily alter behavior. The greater promise of gain is in the environmental and organization actions that tackle the factors that create violence; these include waiting times, crowding, staffing, access control, risk flagging and visible security support [38]. These are more complex and expensive to implement measures, and thus the least well studied. It seems that if there is to be any impact, this requires the support of leadership and involvement of security and management.

Strengths and limitations

No language restrictions were imposed when conducting the search of six databases, dual independent screening and appraisal were undertaken, and importantly, unlike previous studies, the perception outcomes were distinguished from the incident outcomes, and the overall positive effect was not reported. There are several caveats. This protocol was not prospectively registered, which is not the best practice and is a potential source of bias. The search for grey literature was limited, and some evaluations, including unpublished or null studies, may have been missed; publication bias may have led to a greater effect than is reflected in published literature. The conclusions could not be synthesized with a meta-analysis due to heterogeneity, and the synthesis is narrative, though the effect-direction plot is transparent, it is simple to summarize nuanced findings into a direction and a significance indicator. Many of the studies included were from the United States, thereby restricting the generalizability of the findings to other countries with different health systems. Environmental interventions that by themselves have an impact on the way acute behavioral disturbance is managed have been reviewed elsewhere and are poorly evidenced.

Future research

The studies that are needed are clearly identified. They should be controlled, preferably cluster-randomized if possible as Chang et al. have shown is possible in emergency nursing [17] and should

have the incidence of violence as a pre-specified primary outcome, measured through records that are not subject to bias by voluntary reporting, and should be followed for long enough to see whether the effect persists beyond a few months. Trials should be conducted on the different components of multicomponent programmes, separately and together, to determine not only the effectiveness of multicomponent programmes but which component(s) are effective. Departments need to prioritize interventions, and cost-effectiveness analysis, which is virtually lacking in the existing evidence, would help. Evaluation(s) in other North American systems that have varying staffing and security norms would help to clarify the generalizability of this evidence.

Conclusions

De-escalation training and workplace violence prevention programmes enhance knowledge and confidence of emergency department staff who are exposed to this on a daily basis. It is not clear whether these programmes would have any effect on the rates of assaults, after over ten years of assessment: evidence is limited, short term, largely uncontrolled, potentially affected by reporting artefacts, and a single controlled comparison showed no benefit over no intervention. Those measures which are most likely to change the basic rate of violence: environmental and organizational redesign, are the least studied in the field. Training should be continued in EDs, but it should be remembered that training is not the same as safety; future studies should shift from repeatedly showing increases in confidence to testing whether violence decreases (with appropriate controls).

List of abbreviations

CINAHL, Cumulative Index to Nursing and Allied Health Literature; **COVID-19**, coronavirus disease 2019; **ED**, emergency department; **ER**, emergency room; **ICU**, intensive care unit; **JBI**, Joanna Briggs Institute; **MMAT**, Mixed Methods Appraisal Tool; **PICOS**, Population, Intervention, Comparator, Outcome, Study design; **PRISMA**, Preferred Reporting Items for Systematic Reviews and Meta-Analyses; **QI**, quality improvement; **RCT**, randomized controlled trial; **SOAS-R**, Staff Observation Aggression Scale–Revised; **WPV**, workplace violence.

Declarations

Ethics approval and consent to participate

Not applicable. This systematic review analyzed previously published studies and did not involve human participants, human data or human tissue.

Consent for publication

Not applicable.

Availability of data and materials

All data analyzed during this review are included in this published article and its supplementary information file (Additional file 1, the full electronic search strategy). No other datasets were generated or analyzed.

Competing interests

The authors declare that they have no competing interests.

Funding

[This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors or state the funder and its role in study design, data collection, analysis, decision to publish, or manuscript preparation.]

Authors' contributions

[FA] and [SA] conceived and designed the review. [FA] and [TA] developed and ran the search strategy. [FA] and [SA] screened studies, extracted data and appraised methodological quality, with [TA] adjudicating disagreements. [FA] drafted the manuscript. [SA] and [TA] critically revised it for important intellectual content. All authors read and approved of the final manuscript.

Acknowledgements

[Not applicable or acknowledge, with their permission, any information specialist or colleague who contributed but does not meet authorship criteria.]

Authors' information (optional)

[Brief author information may be inserted here.]

References

1. Liu J, Gan Y, Jiang H, Li L, Dwyer R, Lu K, Yan S, Sampson O, Xu H, Wang C, Zhu Y. Prevalence of workplace violence against healthcare workers: a systematic review and meta-analysis. Occupational and environmental medicine. 2019 Dec 1;76(12):927-37. DOI: 10.1136/oemed-2019-105849.
2. Nikathil S, Olaussen A, Gocentas RA, Symons E, Mitra B. Workplace violence in the emergency department: A systematic review and meta analysis. Emergency Medicine Australasia. 2017 Jun;29(3):265-75. DOI: 10.1111/1742-6723.12761.
3. Ramzi ZS, Fatah PW, Dalvandi A. Prevalence of workplace violence against healthcare workers during the COVID-19 pandemic: a systematic review and meta-analysis. Frontiers in psychology. 2022 May 30;13:896156. DOI: 10.3389/fpsyg.2022.896156.
4. Spector PE, Zhou ZE, Che XX. Nurse exposure to physical and nonphysical violence, bullying, and sexual harassment: a quantitative review. International journal of nursing studies. 2014 Jan 1;51(1):72-84. DOI: 10.1016/j.ijnurstu.2013.01.010.
5. Cabilan CJ, Johnston AN. Identifying occupational violence patient risk factors and risk assessment tools in the emergency department: a scoping review. Emergency Medicine Australasia. 2019 Oct;31(5):730-40. DOI: 10.1111/1742-6723.13362.
6. d'Ettorre G, Mazzotta M, Pellicani V, Vullo A. Preventing and managing workplace violence against healthcare workers in Emergency Departments. Acta Bio Medica: Atenei Parmensis. 2018;89(Suppl 4):28. DOI: 10.23750/abm.v89i4-S.7113.
7. Copeland D, Henry M. The relationship between workplace violence, perceptions of safety, and professional quality of life among emergency department staff members in a level 1 trauma center. International emergency nursing. 2018 Jul 1; 39:26-32. DOI: 10.1016/j.ienj.2018.01.006.

8. Cannavò M, La Torre F, Sestili C, La Torre G, Fioravanti M. Work related violence as a predictor of stress and correlated disorders in emergency department healthcare professionals. La Clinica Terapeutica. 2019 Mar 10;170(2):e110-23. DOI: 10.7417/ct.2019.2120.
9. Gates DM, Gillespie GL, Succop P. Violence against nurses and its impact on stress and productivity. Nurs Econ. 2011;29(2):59–66.
10. Hallett N, Dickens GL. De-escalation of aggressive behavior in healthcare settings: Concept analysis. International journal of nursing studies. 2017 Oct 1;75:10-20. DOI: 10.1016/j.ijnurstu.2017.07.003.
11. Geoffrion S, Hills DJ, Ross HM, Pich J, Hill AT, Dalsbø TK, Riahi S, Martínez-Jarreta B, Guay S. Education and training for preventing and minimizing workplace aggression directed toward healthcare workers. Cochrane database of systematic reviews. 2020(9). DOI: 10.1002/14651858.CD011860.pub2.
12. Somani R, Muntaner C, Hillan E, Velonis AJ, Smith P. A systematic review: effectiveness of interventions to de-escalate workplace violence against nurses in healthcare settings. Safety and health at work. 2021 Sep 1;12(3):289-95. DOI: 10.1016/j.shaw.2021.04.004.
13. 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. DOI: 10.3390/ijerph18168459.
14. Chang YC, Hsu MC, Ouyang WC. Effects of integrated workplace violence management intervention on occupational coping self-efficacy, goal commitment, attitudes, and confidence in emergency department nurses: a cluster-randomized controlled trial. International Journal of Environmental Research and Public Health. 2022 Feb 28;19(5):2835. DOI: 10.3390/ijerph19052835.
15. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, Shamseer L, Tetzlaff JM, Akl EA, Brennan SE, Chou R. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. bmj. 2021 Mar 29;372. DOI: 10.1136/bmj.n71.
16. Tufanaru C, Munn Z, Aromataris E, Campbell J, Hopp L. Systematic reviews of effectiveness. Joanna Briggs Institute reviewer's manual. 2017 Apr 19;3. DOI: 10.46658/JBIMES-20-04

17. Munn Z, Moola S, Lisy K, Riitano D, Tufanaru C. Methodological guidance for systematic reviews of observational epidemiological studies reporting prevalence and cumulative incidence data. JBI Evidence Implementation. 2015 Sep 1;13(3):147-53. DOI: 10.1097/XEB.0000000000000054.

18. Hong QN, Fàbregues S, Bartlett G, Boardman F, Cargo M, Dagenais P, Gagnon MP, Griffiths F, Nicolau B, O'Cathain A, Rousseau MC. The Mixed Methods Appraisal Tool (MMAT) version 2018 for information professionals and researchers. DOI: 10.3233/EFI-180221.

19. Ball CA, Kurtz AM, Reed T. Evaluating violent person management training for medical students in an emergency medicine clerkship. Southern medical journal. 2015 Sep;108(9):520-3. DOI: 10.14423/SMJ.0000000000000337.

20. Gillespie GL, Gates DM, Mentzel T. An educational program to prevent, manage, and recover from workplace violence. Advanced emergency nursing journal. 2012 Oct 1;34(4):325-32. DOI: 10.1097/TME.0b013e318267b8a9.

21. Gillespie GL, Farra SL, Gates DM. A workplace violence educational program: A repeated measures study. Nurse education in practice. 2014 Sep 1;14(5):468-72. DOI: 10.1016/j.nepr.2014.04.003.

22. Krull W, Gusenius TM, Germain D, Schnepper L. Staff perception of interprofessional simulation for verbal de-escalation and restraint application to mitigate violent patient behaviors in the emergency department. Journal of Emergency Nursing. 2019 Jan 1;45(1):24-30. DOI: 10.1016/j.jen.2018.07.001.

23. Hills DJ, Robinson T, Kelly B, Heathcote S. Outcomes from the trial implementation of a multidisciplinary online learning program in rural mental health emergency care. Education for Health. 2010 Apr 1;23(1):351.30.

24. Frick J, Slagman A, Möckel M, Searle J, Stemmler F, Joachim R, Lindner T. Experiencing aggressive behavior in the emergency room after the establishment of de-escalation training. Notfall Rettungsmedizin. 2018 Aug;21(5):349-56.2018;21(5):349–56. DOI: 10.1007/s10049-017-0394-3.

25. Buterakos R, Keiser MM, Littler S, Turkelson C. Report and prevent: a quality improvement project to protect nurses from violence in the emergency department. Journal of emergency nursing. 2020 May 1;46(3):338-44. DOI: 10.1016/j.jen.2020.02.010.

26. Gerdtz MF, Daniel C, Dearie V, Prematunga R, Bamert M, Duxbury J. The outcome of a rapid training program on nurses' attitudes regarding the prevention of aggression in emergency departments: a multi-site evaluation. Int J Nurs Stud. 2013;50(11):1434–45. DOI: 10.1016/j.ijnurstu.2013.01.007.

27. Wong AH, Wing L, Weiss B, Gang M. Coordinating a team response to behavioral emergencies in the emergency department: a simulation-enhanced interprofessional curriculum. Western journal of emergency medicine. 2015 Oct 22;16(6):859. DOI: 10.5811/westjem.2015.8.26220.

28. Bataille B, Mora M, Blasquez S, Moussot PE, Silva S, Cocquet P. Training to management of violence in hospital setting. In Annales Francaises D'anesthesie et de Reanimation 2013 Mar 6 (Vol. 32, No. 3, pp. 165-169). DOI: 10.1016/j.annfar.2012.12.010.

29. Gillam SW. Nonviolent crisis intervention training and the incidence of violent events in a large hospital emergency department: an observational quality improvement study. Advanced emergency nursing journal. 2014 Apr 1;36(2):177-88. DOI: 10.1097/TME.0000000000000019.

30. Gillespie GL, Gates DM, Kowalenko T, Bresler S, Succop P. Implementation of a comprehensive intervention to reduce physical assaults and threats in the emergency department. Journal of Emergency Nursing. 2014 Nov 1;40(6):586-91. DOI: 10.1016/j.jen.2014.01.003.

31. Okundolor SI, Ahenkorah F, Sarff L, Carson N, Olmedo A, Canamar C, Mallett S. Zero staff assaults in the psychiatric emergency room: impact of a multifaceted performance improvement project. Journal of the American Psychiatric Nurses Association. 2021 Jan;27(1):64-71. DOI: 10.1177/1078390319900243.

32. Touzet S, Occelli P, Denis A, Cornut PL, Fassier JB, Le Pogam MA, Duclos A, Burillon C. Impact of a comprehensive prevention programme aimed at reducing incivility and verbal violence against healthcare workers in a French ophthalmic emergency department: an

interrupted time-series study. BMJ open. 2019 Sep 1;9(9):e031054. DOI: 10.1136/bmjopen-2019-031054.

33. Anderson L, FitzGerald M, Luck L. An integrative literature review of interventions to reduce violence against emergency department nurses. Journal of clinical nursing. 2010 Sep;19(17-18):2520-30. DOI: 10.1111/j.1365-2702.2009.03144.x.
34. Cabilan CJ, Eley R, Snoswell CL, Johnston AN. What can we do about occupational violence in emergency departments? A survey of emergency staff. Journal of Nursing Management. 2022 Sep;30(6):1386-95. DOI: 10.1111/jonm.13294.
35. Senz A, Ilarda E, Klim S, Kelly AM. Development, implementation and evaluation of a process to recognize and reduce aggression and violence in an Australian emergency department. Emergency Medicine Australasia. 2021 Aug;33(4):665-71. DOI: 10.1111/1742-6723.13702.
36. Vrablik MC, Lawrence M, Ray JM, Moore M, Wong AH. Addressing workplace safety in the emergency department: a multi-institutional qualitative investigation of health worker assault experiences. Journal of Occupational and Environmental Medicine. 2020 Dec 1;62(12):1019-28. DOI: 10.1097/JOM.0000000000002031.
37. Gillespie GL, Gates DM, Mentzel T, Al-Natour A, Kowalenko T. Evaluation of a comprehensive ED violence prevention program. Journal of Emergency Nursing. 2013 Jul 1;39(4):376-83. DOI: 10.1016/j.jen.2012.12.010.
38. Weiland TJ, Ivory S, Hutton J. Managing acute behavioral disturbances in the emergency department using the environment, policies and practices: a systematic review. Western journal of emergency medicine. 2017 May 15;18(4):647. DOI: 10.5811/westjem.2017.4.33411.

Appendix MEDLINE (PubMed) search strategy

The strategy below combines four concept blocks with Boolean operators; it was adapted with database-specific syntax and controlled vocabulary for Embase, CINAHL, PsycINFO, Cochrane CENTRAL and Web of Science.

#1 Population/occupation: "health personnel"[MeSH] OR nurse*[tiab] OR physician*[tiab] OR "medical staff"[tiab] OR clinician*[tiab] OR paramedic*[tiab]

#2 Setting: "emergency service, hospital"[MeSH] OR "emergency department*"[tiab] OR "emergency room*"[tiab] OR "emergency ward*"[tiab] OR "emergency care"[tiab]

#3 Exposure: "workplace violence"[MeSH] OR "workplace violence"[tiab] OR aggress*[tiab] OR assault*[tiab] OR "patient violence"[tiab] OR "occupational violence"[tiab] OR abuse[tiab]

#4 Intervention: "de-escalation"[tiab] OR deescalat*[tiab] OR train*[tiab] OR educat*[tiab] OR "prevention program*"[tiab] OR intervention*[tiab] OR simulation[tiab] OR curriculum[tiab]

#5 #1 AND #2 AND #3 AND #4

#6 Limit #5 to 2010–2022 (no language limit)