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Interventions to Address and Prevent Violence Toward Health Care Workers in the Emergency Department

Rapid Review

CADTH

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Abbreviations

ED	emergency department
HCW	health care worker
RCT	randomized controlled trial
SR	systematic review
WPV	workplace violence

Key Messages

- Seven relevant systematic reviews (SRs) regarding interventions to address and prevent violence in the emergency department (ED) were identified. However, these SRs had a broad focus, and the included studies that were relevant for this current report were few and were generally of low quality.
- Findings were inconsistent regarding education and training interventions for preventing violence in the ED; most relevant primary studies within identified SRs showed there was no difference in the occurrence of violence with interventions including education and training, and a few primary studies reported a reduction in the occurrence violence with interventions including education and training; however, statistical significance of the difference was not reported.
- Pharmacological interventions with haloperidol, lorazepam, droperidol, risperidone, olanzapine, or quetiapine were effective in reducing aggressive behaviour and side effects were generally minimal.
- Implementation of restraint documentation tools was associated with decrease in use of physical restraints to manage aggressive behaviour, and complications were minimal when physical restraints were used for a short duration.
- These findings need to be interpreted with caution considering the limitations such as limited quantity and quality of evidence, and lack of details regarding the characteristics of the population.
- No evidence-based guidelines were identified.

Context and Policy Issues

According to the International Labour Organization, workplace violence (WPV) is defined as "Any action, incident or behaviour that departs from reasonable conduct in which a person is assaulted, threatened, harmed, injured in the course of, or as a direct result of, his or her work."[1] Prevalence of WPV in the health care setting is increasing and has detrimental consequences for the health care worker (HCW), the patient and the organization.[2] Workplace violence in the ED perpetrated by patients and visitors is a serious problem. EDs are considered high-risk areas with incidences of violence against HCWs reported to range between 60% and 90%.[3] Although WPV frequently occurs in the ED, few affected individuals report it, and fewer seek help.[4,5] Causes of violence and aggression can vary and are not always clear. Common causes of aggression and violence include distress and frustration, physiologic imbalances, substance misuse and abuse, intoxication, and mental health issues.[6] WPV may result in physical injuries and mental stress to the HCW, which could lead to staff absenteeism, staff turnover, decreased productivity, and compromised care.[2] Additionally, ED violence has financial implications for the health care system. In Ontario, ED violence is associated with costs of $23.8 million annually.[4]

For the prevention of violence experienced by HCWs in the ED, various interventions have been implemented; these include education and training programs, various pharmacological interventions, and physical restraint procedures. Violence toward HCWs in the ED is a longstanding problem that has reportedly worsened during the COVID-19 pandemic.[7] The evidence regarding interventions for prevention of violence toward HCWs in the ED is needed to make informed decisions regarding implementation of preventive measures.

The purpose of this report is to review the evidence regarding the clinical effectiveness of interventions to address and prevent violence and harassment toward HCWs in the ED, and additionally, to review the evidence-based guidelines regarding interventions to address and prevent violence and harassment toward HCWs in the ED.

Research Questions

1. What is the clinical effectiveness of interventions to address and prevent violence and harassment toward health care workers in the emergency department?
2. What are the evidence-based guidelines regarding the use of interventions to address and prevent violence and harassment toward health care workers in the emergency department?

Methods

Literature Search Methods

A limited literature search was conducted by an information specialist on key resources including MEDLINE, the Cochrane Database of Systematic Reviews, the international HTA database, the websites of Canadian and major international health technology agencies, as well as a focused internet search. The search strategy comprised both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. The main search concepts were violence prevention and EDs. No filters were applied to limit the retrieval by study type. Comments, newspaper articles, editorials, and letters were excluded. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 01, 2011 and May 10, 2021.

Selection Criteria and Methods

One reviewer screened citations and selected studies. In the first level of screening, titles and abstracts were reviewed and potentially relevant articles were retrieved and assessed for inclusion. The final selection of full-text articles was based on the inclusion criteria presented in Table 1. In addition, articles on different settings which included the ED or emergency service were included. Articles which included education and training as a component of a multimodal treatment were also included. In case of SRs with broad objectives that included primary studies with various settings, interventions, and outcomes only the subset of included primary studies which had relevant settings, interventions, and outcomes according to these selection criteria were considered for this report.

Exclusion Criteria

Articles were excluded if they did not meet the selection criteria outlined in Table 1, they were duplicate publications, or were published before 2011. Overviews of SRs were excluded if they lacked sufficient details, and instead the relevant individual systematic reviews were included.

Articles that did not specify the setting to be ED or emergency service were excluded. Guidelines with unclear methodology were also excluded.

Critical Appraisal of Individual Studies

The included publications were critically appraised by 1 reviewer using A MeaSurement Tool to Assess systematic Reviews 2 (AMSTAR 2)[8] as a guide. Summary scores were not calculated for the included studies; rather, the strengths and limitations of each included publication were described narratively.

Summary of Evidence

Quantity of Research Available

A total of 569 citations were identified in the literature search. Following screening of titles and abstracts, 524 citations were excluded and 45 potentially relevant reports from the electronic search were retrieved for full-text review. Two potentially relevant publications were retrieved from the grey literature search for full-text review. Of these 47 potentially relevant articles, 40 publications were excluded for various reasons, and 7 publications met the inclusion criteria and were included in this report. These comprised 7 systematic reviews (SRs)[6,9-14] No randomized controlled trials (RCTs) or evidence-based guidelines were identified. Appendix 1 presents the PRISMA[15] flow chart of the study selection.

Table 1: Selection Criteria

Criteria	Description
Population	Patients presenting to the ED, staff in the ED, family and visitors in the ED
Intervention	• Chemical and pharmacological restraints (e.g., antipsychotic or sedative medication administered orally or via injection), • Physical restraints (e.g., belt, jacket), • System alerts within the EMR (e.g., calling security or a family member proactively for the patient), • Education and training for staff (e.g., crisis intervention training, violence prevention education, de-escalation or debriefing strategies)
Comparator	Chemical restraints, physical restraints, education or training, no treatment (e.g., no restraints, alerts, or training)
Outcomes	Q1: Clinical benefits and harms (e.g., mortality, rates of violent incidents [including verbal violence and physical injuries]), level of restraint use, patient satisfaction with care (e.g., complaints regarding violence prevention measures) reporting violent episodes, emergency department length of stay, adverse events related to inappropriate use of drugs or restraints, staff safety and well-being (e.g., staff burnout, absenteeism, attrition, mental health [e.g., PTSD, anxiety]) Q2: Recommendations regarding best practices to address and prevent violence toward HCWs in the ED, including patient care processes and care environments
Study designs	HTA, SR, RCTs, and evidence-based guidelines

ED = emergency department; EMR = electronic medical record; HTA = health technology assessment; PTSD = post-traumatic stress disorder; Q = question; RCT = randomized controlled trial; SR = systematic review.

Summary of Study Characteristics

Seven relevant SRs[6,9-14] were identified. All 7 SRs[6,9-14] had broader inclusion criteria than the current report in terms of setting and interventions. These SRs investigated ED settings as well as various other settings such general hospitals (if ED not mentioned), psychiatric treatment facilities and general practice; and irrelevant interventions (e.g., installations of cameras, alarm systems, and door locks; security staff) and outcomes (e.g., prevalence of WPV, and under-reporting of WPV) for the current report. Only the characteristics and results of the subset of relevant studies will be described in this report. Additional details regarding the characteristics of included publications are provided in Appendix 2.

Study Design

Seven SRs[6,9-14] were included; 2 SRs[6,9] included meta-analysis and the remaining 5 SRs[10-14] were narrative. These SRs were published between 2016 and 2020. Multiple databases were searched. The literature search periods were up to June 2020 for the SR by Geoffrian et al.[9]; up to May 2019 for the SR by Spelten et al[6]; between January 2000 and April 2019 for the SR by Raveel and Schoenmakers[10]; between January 2009 and December 2017 for the SR by d'Ettore et al[11]; up to April 2016 for the SR by Weiland et al.[12]; between January 1991 and February 2016 for the SR by Gaynes et al.[14]; and up to December 2015 for the SR by Ramacciati et al.[13] The relevant primary studies in these SRs comprised RCTs, non-randomized comparative studies, and pre- and post-studies and the number of relevant primary studies in each SR ranged between 1 and 5. In addition, 1 SR[13] included a review article, and 1 SR[10] included a SR and a review article. The included publications in these SRs were published between 1998 and 2015. There was some overlap in the relevant studies included in the SR; it should therefore be noted that the findings from the SR are not exclusive. A table depicting the degree of overlap in relevant primary studies is presented in Appendix 5.

Country of Origin

The countries of origin of the first authors of the included SRs[6,9-14] were Australia,[6,12] Belgium,[10] Canada,[9] Italy,[11,13] and the US.[14] The majority of primary studies included in these SRs were conducted in the US.

Patient Population

Characteristics of the patients and the HCW were rarely described, and if described they were presented for a few of the included primary studies. In 3 SRs,[6,9,12] the majority of the HCW investigated were nurses and in 2 SRs[6,12] the majority of HCWs were females. The study settings were EDs, emergency psychiatric treatment facilities, or trauma centers. One SR[14] was on adult patients with psychiatric disorders.

Interventions and Comparators

The interventions and comparators were described but lacked details.

One SR[9] reported on education and training interventions compared with no education and training interventions. Two SRs[10,12] reported on before and after implementation of education and training interventions. One SR[11] reported on comparisons of 2 different education and training interventions. Four SRs[6,12-14] reported on before and after implementation of a multimodal intervention, which included education and training as 1 component. One SR[14] reported on comparisons between different pharmacological interventions. Three SRs[10,12,14] reported on use of physical restraints.

Outcomes

Outcomes included episodes of aggression, or assault,[6,9-14] restraint episodes (duration or frequency of use of restraints)[10,12,14] and adverse effects experienced by patients.[10,14] Follow-up durations were not always reported. For interventions involving education and training, follow-up duration was reported in 4 SRs,[6,9,12,14] and ranged between 6 months and 24 months. For pharmacological interventions, follow-up duration was reported in 1 SR[14] and ranged between 1 hour and 72 hours.

Summary of Critical Appraisal

An overview of the critical appraisal of the included SRs is summarized below. Additional details regarding the strengths and limitations of included SRs are provided in Appendix 3.

In all 7 SRs,[6,9-14] the objectives and inclusion criteria were clearly stated, multiple databases were searched, selection of articles was described by the authors and a list of selected articles was presented. In 6 SRs,[6,9,10,12-14] the associated flow chart for article selection was presented but not presented in 1 SR.[11] The list of excluded studies was presented in 3 SRs[6,9,14] and not in 4 SRs.[10-13] Article selection was done independently by 2 reviewers in 5 SRs[6,9,11,12,14] and was unclear if done in duplicate in 2 SRs.[10,13] Data extraction was done independently by at least 2 reviewers in 3 SRs,[6,9,11] and was done by 1 reviewer and checked by another reviewer in 2 SRs.[12,14] In 2 SRs[10,13] it was unclear if data extraction was done in duplicate hence the potential for errors cannot be ruled out. Quality assessment was conducted in 5 SRs and considered when formulating conclusions[6,9,10,12,14]; generally the studies were reported by SR authors to be of low quality. Quality assessment was not conducted in 2 SRs.[11,13] In all 7 SRs[6,9-14] the study characteristics were described but lacked details with respect to population characteristics and settings hence it was unclear if there were confounding factors and how they could have impacted findings. In 2 SRs[6,9] meta-analysis was conducted when appropriate; however, as 1 study from each of these 2 SRs was relevant for our report, whether or not meta-analysis was conducted is not a major factor for our appraisal purposes. In the remaining 5 SRs[10-14] findings were described narratively which seemed appropriate considering the variations in the designs and characteristics of included studies. In 6 SRs[6,9-14] the conflicts of interest of the authors were presented and seemed unlikely to introduce bias. In 1 SR[11] conflicts of interest of the authors were not presented, hence it was unclear if any conflicts of interest existed that could have influenced SR findings and conclusions.

Summary of Findings

Main findings from the included SRs are presented below. Additional details of the main findings and the SR authors' conclusions are presented in Appendix 4.

Clinical Effectiveness of Interventions to Address and Prevent Violence in Emergency Departments

Education and Training

All 7 included SRs[6,9-14] reported on education and training interventions. The SR by Geoffrian et al.[9] showed no statistically significant reduction in risk of episodes of aggression with education and training (face-to-face feedback and discussion of violent events) compared with no education and training; risk ratio (95% confidence interval), 1.14 (0.95 to 1.47), (1 relevant cluster RCT). The SR by Spelten et al.[6] showed that episodes of aggression were not different with a multimodal intervention that included education and training compared to practice as usual in 1 relevant pre- and post-intervention study. The SR by Raveel and

Schoenmakers[10] showed no reduction in physical assaults against doctors with education and training intervention, based on findings from 1 relevant publication (1 review article). The SR by Weiland et al.[12] reported conflicting results with 1 pre- and post-intervention study showing reduction in violent behaviour with education and dialogue (statistical significance was not reported); and 1 controlled quasi-experimental study showing reduction in assault rates with both the multimodal intervention that included education and training and practice as usual (statistical significance was not reported); the authors considered the evidence to be of weak quality. Relevant studies in the SR by Ramacciati et al.[13] showed conflicting results regarding the impact of multimodal interventions that included education and training on assault rates; 1 quasi-experimental study showed a decrease in assault rates in both the intervention and control group (not specified), while 1 review article reported that there was no decrease in assaults with a multimodal intervention that included education and training. The SR by d'Ettorre et al.[11] showed that training based on lectures was less effective than interactive and dynamic learning methods in preventing WPV. The SR by Gaynes et al.[14] showed that with multimodal interventions including staff training there was a decrease in seclusion and restraint episodes relative to usual care (based on findings from 2 pre- and post-intervention studies).

Pharmacological Interventions

The SR by Gaynes et al.[14] investigated various pharmacological interventions. They reported significantly greater improvement in aggressive behaviour (determined using the Overt Aggressive Scale) at 60 minutes ($P = 0.03$) and a significantly shorter time to improvement ($P = 0.028$) with haloperidol plus lorazepam compared with lorazepam alone (findings from 1 RCT). They also reported that up to 60 minutes there was a significantly greater decrease in combative and aggressive behaviour with droperidol compared with lorazepam, $P < 0.001$ (findings from 1 RCT). However, they also reported that while risperidone, olanzapine, quetiapine, and haloperidol were associated with improvements from baseline in aggressive behaviour up to 72 hours post-administration (determined using the Modified Overt Aggressive Scale), there were no significant between-group differences, P values were not reported (findings from 1 non-randomized study). This SR also showed there were no medication adverse effects with either haloperidol plus lorazepam or lorazepam alone; and few medication adverse effects with risperidone, olanzapine, quetiapine, or haloperidol that were not significantly different between groups (P ranging from 0.012 to 0.964); the authors considered the strength of evidence to be insufficient. The SR by Raveel and Schoenmakers[10] reported that medication reduces the incidence of aggressive patient behaviour (based on moderate quality evidence from 1 included SR; details of medication used were not provided).

Physical Restraints

The SR by Weiland et al.[12] reported that with implementation of restraint documentation tools was associated with a decrease in use of restraints (based on weak quality evidence from 2 pre- and post-intervention studies). The SR by Raveel et al.[10] reported that mechanical restraints resulted in minimal complications when used for short intervals (based on low-quality evidence from 1 included SR).

Guidelines

No evidence-based guidelines were identified hence a summary cannot be provided.

Limitations

The quantity and quality of the relevant studies included in the SRs was limited. Most of the included studies were pre- and post-intervention studies that are associated with inherent biases such as selection bias and recall bias. Also, confounders and their impact on results were unclear. In some studies, education and training was 1 component of a multimodal intervention; hence, the impact of education and training alone is unclear. Measures of the outcome data were not always specified.

None of the identified SRs reported on interventions including system alerts within the electronic medical records or on outcomes such as staff burnout and attrition.

Since the literature search was focused on EDs, it is possible that studies with multiple settings with ED embedded in it may have been missed.

The generalizability of the findings to the Canadian context is unclear, as none of the studies were conducted in Canada. However, since the majority of the studies were conducted in the US, the health care settings may not be very different and hence less likely to be an issue.

No evidence-based guidelines were identified.

Conclusions and Implications for Decision- or Policy-Making

Seven relevant SRs[6,9-14] were identified regarding interventions for addressing and preventing violence toward HCWs in EDs. All 7 SRs[6,9-14] reported on a variety of education and training interventions. In addition, of the 7 SRs,[6,9-14] 2 SRs[10,14] reported on pharmacological interventions and 3 SRs[10,12,14 10 761,12,14] reported on restraint or restraint and seclusion interventions. Findings were inconsistent regarding interventions with education and training; most primary studies captured by the SRs showed there was no difference in the occurrence of violence with interventions including education and training, and a few studies showed that there was a reduction in the occurrence violence with interventions including education and training; however statistical significance of the difference was not reported. It is possible that inconsistencies in the findings may be due to variations in the education and training interventions investigated in the studies and in some studies education and training was 1 component of a multimodal intervention. The quantity of evidence with respect to pharmacological interventions and interventions involving restraint and/or seclusion was limited, and the SR authors considered the strength of evidence to be insufficient. Relevant primary studies within the SR by Gaynes et al.[14] showed significantly greater improvement in aggressive behaviour with haloperidol plus lorazepam compared with lorazepam alone; and droperidol compared with lorazepam. They also reported that there were no significant between-group differences in aggressive behaviour with risperidone, olanzapine, quetiapine, and haloperidol. Two pre- and post-intervention studies captured by the SR by Weiland et al.[12] showed that with implementation of restraint documentation tools there was a decrease in restraint episodes. Findings need to be interpreted with caution in the light of limitations such as few studies that were generally of low quality, and lack of details regarding the characteristics of the population and interventions.

Individual publications of non-randomized studies that were not captured in included SRs were identified from the literature search, though they did not satisfy the inclusion criteria for this report; therefore, they were not included, and critical appraisal of these studies were not conducted. However, findings from these studies[5,16-19] may provide some insights regarding managing WPV in the EDs and are discussed here. As with the findings of included SRs, the findings of these non-randomized studies that evaluated a variety of education and training programs were mixed, with 1 study[16] showing no benefit regarding rates of violence with education and training and 4 studies showing benefit with the use of education plus managerial intervention,[17] risk assessment tools[5,18] or a preventive protocol including an algorithm as 1 component.[19] The authors of 1 study[18] cautioned that further research is still needed to make definitive conclusions regarding effectiveness of the interventions.

No evidence-based guidelines were identified.

Further research using well-designed studies with large sample sizes are needed to get a better understanding of which interventions used alone or in combination with other interventions will help to reduce WPV in the EDs. Confounding factors need to be taken into consideration in assessing the benefits and harms of these interventions, as outcomes may be impacted by factors such as characteristics of patients and HCWs, and type of setting. It would be useful to investigate which subsets of HCW will benefit from which type of interventions given potentially varying types or frequency of interactions with patients, and which types of interventions will be useful to manage different subsets of patients. Also, as the education and training interventions investigated in published studies were heterogeneous, it is difficult to come to strong conclusions regarding education and training interventions as a whole. Therefore, more studies investigating a particular education and training would be needed to make definitive conclusions.

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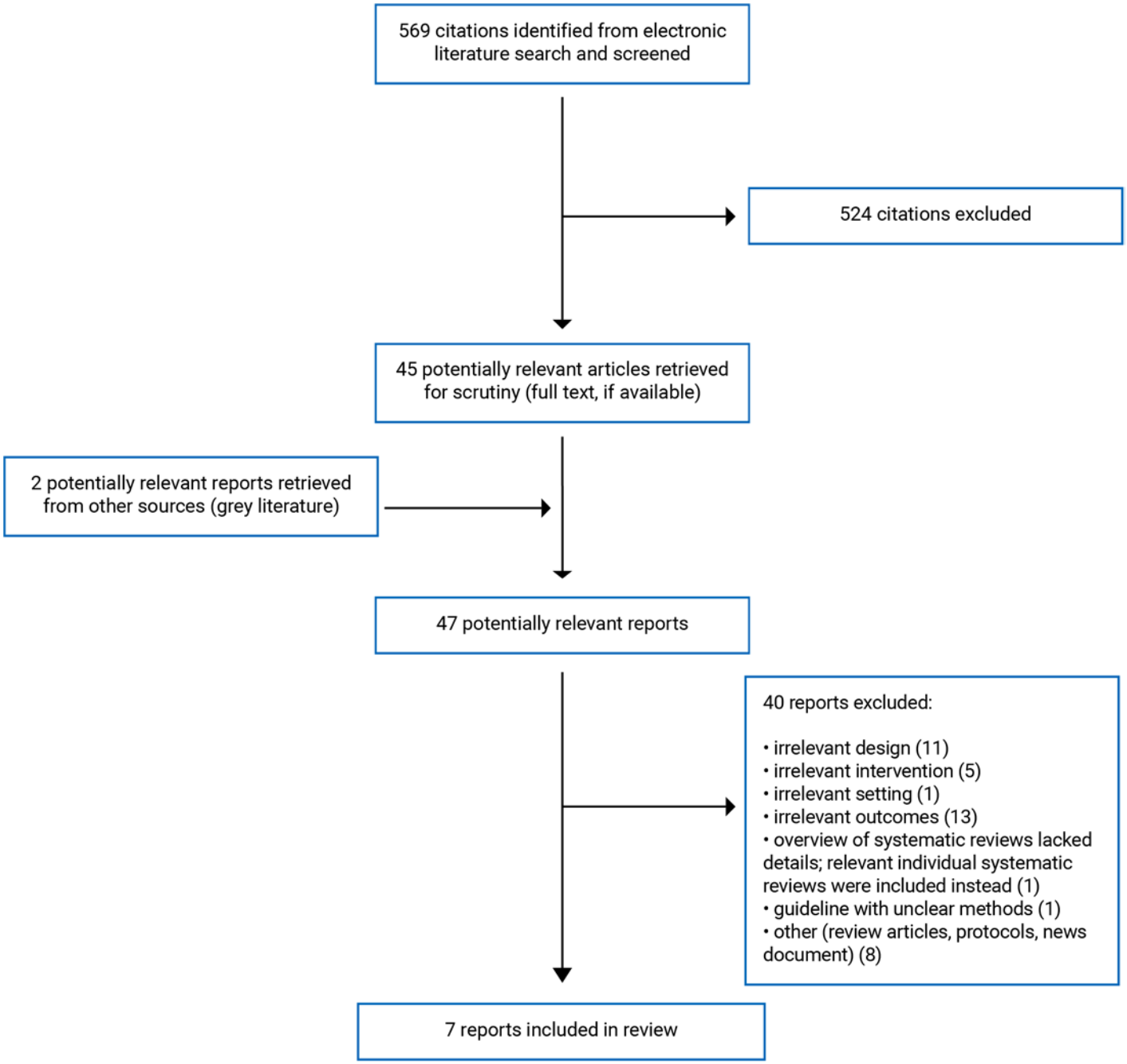
Appendix 1: Selection of Included Studies

Figure 1: Selection of Included Studies



Appendix 2: Characteristics of Included Publications

Table 2: Characteristics of Included Systematic Reviews

Study citation, country, funding source	Study designs and numbers of primary studies included	Population characteristics	Intervention and comparator(s)	Clinical outcomes, length of follow-up
Geoffrian et al. (2020)[9] Canada Funding: No external support. Internal support: career grant to the first author	Systematic review with meta-analyses. Included studies (total) = 9 Relevant included study = 1; (Study 1) was a cluster RCT from Sweden (setting: emergency, inpatient, and home health). Inclusion criteria: education and training interventions targeting aggression prevention toward HCW; and RCT, cluster RCT, and controlled before and after study. Exclusion criteria: Not explicitly stated. However, reasons for excluding studies were reported. Aim: assessment of education and training interventions to prevent or reduce WPA toward HCW by patients and patient advocates	Characteristics of patients: NR. Characteristics of HCW. Registered and practical nurses; and practical nurses with mental health training. Age and sex: NR	Intervention: education (face-to-face program: feedback and follow-up discussion of registered violent events) Comparator: no face-to-face program	Outcomes: episodes of aggression or WPV Follow-up: 12 months

Study citation, country, funding source	Study designs and numbers of primary studies included	Population characteristics	Intervention and comparator(s)	Clinical outcomes, length of follow-up
Spelten et al. (2020)[6] Australia Funding: None	Systematic review with meta-analysis Included studies (total) = 7 Relevant included study = 1 This study was a controlled before and after study from the US (Setting: 6 EDs [2 trauma centres, 2 urban tertiary ED and 2 suburban 2]; 3 EDs for intervention group and 3 EDs for control group). Inclusion criteria: Any organizational intervention to prevent or reduce WPV toward HCW; and RCT, cluster RCT, and controlled before and after study. Exclusion criteria: Not explicitly stated. However reasons for excluding studies were reported. Aim: assessment of organizational interventions to prevent or reduce WPA toward HCW by patients and patient advocates	Characteristics of patients: NR. Characteristics of HCW. Staff members of EDs, with 56% being nurses. N = 209. Age (mean [SD]) (years): 37.3 (10.5). Sex: 71% female.	Intervention: comprises 3 components (environmental changes; policies and procedures; and education and training), implemented over 3 months. Control: practice as usual	Outcomes: Change in incidence of aggression Follow-up:18 months

Study citation, country, funding source	Study designs and numbers of primary studies included	Population characteristics	Intervention and comparator(s)	Clinical outcomes, length of follow-up
Raveel and Schoenmakers (2019)[10] Belgium Funding: None	Systematic review, narrative Included publications (total) = 41 Relevant included publications = 3 These comprised 1 RCT from Sweden, 1 review of WPV and 1 systematic review, countries NR. Inclusion criteria: qualitative and quantitative studies, SRs, and reviews on workplace violence toward HCW; publications in English. Exclusion criteria: case reports or opinion articles Aim: To investigate interventions to prevent aggression against doctors	Characteristics of patients: NR. Characteristics of HCW (doctor): NR	*RCT:* Intervention: structured feedback program Control: no structural feedback program *Review:* Intervention: training (and modifications in ED physical structure and security; and policy changes). *Systematic review:* Intervention: staff training, pharmacological treatment, and mechanical restraint.	Outcomes: Change in incidence of aggression, acquiring of knowledge, adverse effects Follow-up: NR
D'Ettorre et al. (2018)[11] Italy Funding: NR	Systematic review, narrative Included publications (total) = 60. Relevant included publication = 1; country and type of study were not reported. Inclusion criteria: original research articles (not reviews) and published between 2007 to 2017. Exclusion criteria: Studies not on ED, published before 2007, non-English publications, and not full reports (e.g., letters to the editor) Aim: To investigate the evidence related to the issue of WPV toward HCWs in EDs for the period 2007 to 2017.	Characteristics of patients: NR Characteristics of HCW: NR	Intervention 1: training based only on lectures Intervention 2: training programs in hospital settings based on interactive and dynamic learning methods for ED workers (e.g., small-group learning, interactive learning, and simulation exercises)	Outcomes: prevention of WPV Follow-up: NR

Study citation, country, funding source	Study designs and numbers of primary studies included	Population characteristics	Intervention and comparator(s)	Clinical outcomes, length of follow-up
Weiland et al. (2017)[12] Australia Funding: NR. However, It was mentioned that this systematic review was published in the journal that requires all authors to declare funding sources	Systematic review, narrative Included studies (total) = 8. Relevant included studies = 4 These were pre- and post-studies Inclusion criteria: Adult participants (older than 18 years), studies regarding managing ABDs within ED; RCT, non-randomized controlled trial, prospective or retrospective cohort studies; case-control studies, and pre-post observational studies; and published in English. Exclusion criteria: Studies using only qualitative methods, meta-analyses, SRs, and integrated reviews. Aim: To assess the efficacy of strategies for ABD management within EDs	Study 1 (Calihol et al.) 478 patients (Pre-intervention 254 patients, Post-intervention: 224 patients) Other characteristics NR. Characteristics of HCW: NR Study 2 (Gillespie et al.) Characteristics of patients: NR Characteristic of HCW: 209 HCW; 71% were female; and 56% were nurses Study 3 (McMohan et al.) Characteristics of patients: NR Characteristics of HCW: 62 ED nurses, 50% were older than 41 years, and 84% were female. Study 4 (Emde et al.) Characteristics of patients: NR Characteristic of HCW: NR	Study 1 (Calihol et al.) Intervention included education focused on restraint and violent behaviour; dialogue between staff through meetings and journal club; medical presence during restraint interventions; and followed by debriefing after restraint intervention. Study 2 (Gillespie et al.) Multimodal intervention included education and training; environmental changes; and policies and procedures. Study 3 (McMohan et al.) Intervention: Training and modified restraint documentation tool Study 4 (Emde et al.) Intervention included restraint and de-escalation education; safety modification to seclusion room; restraint form and monthly review of charts; and psychiatric staff present for seclusion observation	Study 1 (Calihol et al.) Outcome: Change in violent behaviour. Study duration 10 month (5 months pre, and 5 months post). Study 2 (Gillespie et al.) Outcome: Assault rate. Study duration 18 month (9 months pre, and 9 months post) Study 3 (McMohan et al.) Restraint episode, duration of restraint. Study duration was pre: January to July 2000; post: 2001, dates not specified Study 4 (Emde et al.) Outcomes: Restraint usage, staff injury

Study citation, country, funding source	Study designs and numbers of primary studies included	Population characteristics	Intervention and comparator(s)	Clinical outcomes, length of follow-up
Gaynes et al. (2016)[14] US Funding: NR	Systematic review, narrative Included studies (total) = 29. Relevant included studies = 5 These 5 studies comprised 2 RCTs Bieniet et al., and Richards et al.), 1 NRCT (Villari et al.), and 2 pre-and post-studies (D'Orio et al. and Forster et al.), all from the US Inclusion criteria: adults 18 years or older with an identified psychiatric disorder; acute care settings including ED or hospital (psychiatric hospitals or general medical hospitals); location: developed countries; and study designs such as systematic review, RCs, NRCT, cohort study, case-control study, pre- and post-studies and interrupted time series. Exclusion criteria: study design: case studies case series, cross-sectional studies: and non-SRs; and non-English publications Aim: to assess effectiveness of strategies to prevent and de-escalate aggressive behaviour in psychiatric patients.	Characteristics of patients: Adult (18 years or older) with an identified psychiatric disorder. Characteristics of the HCW: NR Study 1 RCT (Bieniet et al.), N (patients) = 20 Setting: psychiatric emergency service, US Study 2 RCT (Richards et al.), N (patients) = 202 Setting: large urban university ED, US. Study 3 NRCT (Villari et al.), N (patients) = 101 Setting: psychiatry emergency service, US Study 4 pre- and post-study (D'Orio et al.), pre- and post-study, N (patients): NR. Setting: psychiatry emergency service, US. Study 5 pre and post-study (Forster et al.), sample size (number of admissions) = 5,570, but it was unclear how many of these admissions were re-admissions; N (patients) = 3,010. Setting: Urban acute care inpatient psychiatric hospital (psychiatric emergency service and 4 locked inpatient wards), US	Study 1 (Bieniet et al.) Intervention 1: haloperidol plus lorazepam Intervention 2: lorazepam Study 2 (Richards et al.), Intervention 1: droperidol Intervention 2: lorazepam Study 3 (Villari et al.), Intervention 1: risperidone Intervention 2: olanzapine Intervention 3: quetiapine Intervention 4: haloperidol Study 4 (D'Orio et al.), Intervention: multimodal (e.g., staff training, and implementation of a response team for behavioural emergencies) Comparator: usual care (9 months before intervention) Study 5 (Forster et al.), Intervention: multimodal (e.g., staff training; regular discussion of seclusion and restraint on units; review of policy; and hospital-wide publicity of effort) Comparator: usual care (12 months before intervention)	Outcomes: Episodes of aggression, restraints, seclusion, staff injuries, and adverse effects Follow-up: Durations (from baseline through post-intervention or longer-term follow-up) ranged between 1 hour and 72 hours for the 2 RCTs and 1 NRCT. Follow-ups ranged between 18 and 24 months for the 2 pre- and post-studies

Study citation, country, funding source	Study designs and numbers of primary studies included	Population characteristics	Intervention and comparator(s)	Clinical outcomes, length of follow-up
Ramaciatti et al. (2016)[13] Italy Funding: NR	Systematic review, narrative Included publications (total) = 10 Relevant included publication = 2; 1 publication was a quasi-experimental study, and 1 publication was a literature review Inclusion criteria: Articles in English, French and Italian; abstracts or full-text articles; publications from January 1, 2011 to December 7, 2015 Exclusion criteria: not specified Aim: to review the current approaches to reduce WPV in the ED, with a focus on the effectiveness of emergency response programs	Study: Characteristics of patients: NR. Characteristics of HCW. N = 209 Review: Characteristics of patients NR. Characteristics of HCW NR	Study: Intervention included education and training; environmental changes; and policies and procedures. Comparator: not described. Review: Interventions included training and modifications in ED physical structure and security; and policy changes	Study: Outcome: assault risk. Intervention was implemented over 3 months (June 2010 to August 2010). Review: Outcome: assault rate. Study durations were not presented

ABD = acute behavioural disturbances; ED = emergency department; HCW = health care worker; NR = not reported; NRCT = non-randomized study; RCT = randomized controlled trial; SR = systematic review; WPA = workplace aggression.

Appendix 3: Critical Appraisal of Included Publications

Table 3: Strengths and Limitations of Systematic Reviews Using AMSTAR 2[8]

Strengths	Limitations
Geoffrian et al. (2020),[9] Canada	
The objective was clearly stated. Multiple databases (MEDLINE, Embase, CENTRAL, CINAHL, PsycINFO, clinical trials and other registries) were searched up to June 2020. In addition, reference lists of primary studies and reviews were searched. Study selection was described, and a flow chart was presented. A list of included studies was provided. A list of excluded studies was provided. Article selection was done by independently by 4 reviewers. Data extraction was done by 4 reviewers after piloting the data extraction form using 1 study. Data extraction was done independently by 2 or more reviewers done. Quality assessment was done independently by 4 reviewers using the Cochrane risk of bias tool. The quality of evidence was determined using GRADE. The studies were reported to be of low quality. Characteristics of the included studies were presented but lacked details Meta-analyses were conducted when possible. The authors reported that for assessing the quality of the evidence they considered several factors, 1 being potential for publication bias however details as to how it was conducted was not presented. It was reported that the authors had no known conflicts of interest.	Though publication bias was considered for quality assessment, the method for determining publication bias was not presented.

Strengths	Limitations
Spelten et al. (2020),[6] Australia	
The objective was clearly stated. Multiple databases (MEDLINE, Embase, CENTRAL, CINAHL, PsychInfo, clinical trials and other registries) were searched up to 25 May 2019. In addition, reference lists of primary studies and reviews were searched. Study selection was described, and a flow chart was presented. A list of included studies was provided. A list of excluded studies was provided. Article selection was done by independently by 2 or more reviewers. All 6 reviewers, in 3 pairs of 2, independently extracted data All 6 reviewers, in 3 pairs of 2, independently conducted quality assessment using the Cochrane risk of bias tool. The quality of the evidence was determined using GRADE. The quality of evidence was very low. Characteristics of the included studies were presented but lacked details. Meta-analyses were conducted when possible. The authors reported that for assessing the quality of the evidence they considered several factors, 1 being potential for publication bias; however, details as to how it was conducted were not presented. Three of the 6 authors mentioned there were no conflicts of interest. The remaining 3 authors mentioned they had publication and/or research interest in violence toward HCWs.	Though publication bias was considered for grading the evidence, the method for determining publication bias was not presented.
Raveel and Schoenmakers, (2019),[10] Belgium	
The objective was clearly stated. Multiple databases (PubMed, Embase, TRIP, Cochrane) were searched between January 2000 to April 2019. In addition, reference lists of articles were searched. Study selection was described, and a flow chart was presented. A list of included studies was provided. Quality of the evidence was determine using the Oxford 2011 levels of evidence, GRADE,[20,21] and GRADE-CERQual.[22] Generally, the evidence was of low quality. Characteristics of the included publications were presented, but details were lacking. Meta-analysis was not conducted due to lack of numerical data. It was mentioned that the authors had no conflicts of interest.	A list of excluded studies was not provided. Unclear if article selection was done in duplicate. Unclear if data extraction was done in duplicate. Unclear if quality assessment was done in duplicate. Details of patient and HCW characteristics were not presented. Publication bias does not appear to have been assessed.

Strengths	Limitations
D'Ettorre et al. (2018),[11] Italy	
The objective was clearly stated. Two databases (PubMed and Web of Science) were searched from January 2007 to December 2017. Study selection was described but no flow chart was presented. A list of included studies was provided. Article selection was done independently by 2 reviewers. Data extraction was doe independently by 2 reviewers. Characteristics of the included publications were presented, but details were lacking. Meta-analysis was not conducted; reason was not stated. A narrative review was conducted.	A list of excluded studies was not provided. Unclear if quality assessment was conducted. Details of patient and HCW characteristics were not presented. Publication bias does not appear to have been investigated. Conflicts of interest of the authors were not presented.
Weiland et al. (2017),[12] Australia	
The objective was clearly stated. Multiple databases (MEDLINE, Embase, CINAHL Plus, PsychInfo) were searched on 21 April 2016. In addition reference lists of meta-analyses, SRs, and integrated reviews were searched. Study selection was described, and a flow chart was presented. A list of included studies was provided. Article selection was done independently by 2 reviewers. Data extraction was done by 1 reviewer and checked by another reviewer. Quality assessment was done independently by 2 reviewers using the EPHPP Quality assessment tool for quantitative studies.[23] The quality of evidence was found to be weak. Characteristics of the included studies were presented but details were lacking. Meta-analysis was not conducted; reasons were not stated. A narrative review was conducted. It was mentioned that this systematic review was published in a journal that requires all authors to declare their conflicts of interest. It was mentioned that of the 3 authors, 1 author was a co-author in a study included in this systematic review.	A list of excluded studies was not provided. Details of patient and HCW characteristics were not presented. Publication bias does not appear to have been undertaken.

Strengths	Limitations
Gaynes et al. (2016),[14] US	
The objective was clearly stated. Multiple databases (MEDLINE, Embase, Cochrane library, CINAHL, PsychInfo, clinical trials and other registries) were searched from 1 January 1991 to 3 February 2016. In addition, grey literature; and reference lists of included studies and reviews were searched. Study selection was described, and a flow chart was presented. A list of included studies was provided. A list of excluded studies was provided. Article selection was done independently by 2 reviewers. Data extraction was done by trained reviewers and checked by a senior reviewer. Quality assessment was conducted using the Cochrane risk of bias tool for RCTs, and RTI risk of bias for observational studies. Quality assessment was not conducted for pre- and post-studies. Characteristics of the included studies were presented but lacked details. Meta-analysis was not conducted; reasons were not stated. A narrative review was conducted. The authors reported that they did not find enough comparative evidence to warrant quantitative assessment of publication bias (such as funnel plot, trim and fill method, or selective modelling). It was reported that the investigators did not have any affiliation or financial involvement that conflicts with the material presented in the report.	Unclear if quality assessment was conducted in duplicate.
Ramacciati et al. (2016),[13] Italy.	
The objective was clearly stated. Two databases (PubMed and CINAHL) were searched on December 7, 2015. Study selection was described, and a flowchart was presented. A list of included studies was provided. It was reported that the authors had no conflicts of interest.	A list of excluded studies was not provided. Unclear if article selection was done in duplicate. Unclear if data extraction was done in duplicate. Quality assessment does not appear to have been conducted. Details of patient and HCW characteristics were not presented, Publication bias does not appear to have been assessed.

AMSTAR 2 = A MeaSurement Tool to Assess systematic Reviews 2; EPHPP = Effective Public Health Practice Project; HCW = health care worker; GRADE = Grading Recommendations Assessment, Development and Evaluation; GRADE-CERQual = GRADE Confidence in Evidence From Reviews of Qualitative Research; NR = not reported SR = systematic review.

Appendix 4: Main Study Findings and Authors' Conclusions

Summary of Findings Included Systematic Reviews

Geoffrian et al. (2020),[9] Canada

Main study findings

- Study 1 (Arnetz et al., 2000), cluster RCT
  - Setting: Emergency; in-patient; and home health (Sweden).
  - Intervention: education (face-to-face program: feedback and follow-up discussion of registered violent events)
  - Control: Violent events registered but no feedback or follow-up discussions.
  - Follow-up: 12 months
  - Result: Risk of episodes of aggression with intervention compared to control.
  - RR (95% CI) = 1.14 (0.95 to 1.47), between group not statistically significant; (1 cluster RCT, N = 291).
  - (Certainty of evidence: low, using GRADE)

Authors' conclusion

"Education combined with training may not have an effect on workplace aggression directed toward healthcare workers, even though education and training may increase personal knowledge and positive attitudes. Better quality studies that focus on specific settings of healthcare work where exposure to patient aggression is high are needed. Moreover, as most studies have assessed episodes of aggression toward nurses, future studies should include other types of healthcare workers who are also victims of aggression in the same settings, such as orderlies (healthcare assistants). (p. 20)".[9]

Spelten et al. (2020),[6] Australia

Main study findings

- Study 1 (Gillespie et al. 2014), controlled before and after study.
  - Setting: emergency departments
  - Intervention: organizational intervention comprised of 3 components (environmental changes; policies and procedures; and education and training).
  - Control: Practice as usual.
  - Follow-up: 18 months.
  - Result: With respect to aggressive episodes, the authors of the systematic review reported that the relative effect and 95% CI were not estimable. The change values were 0.04 for both the intervention and control groups. The authors reported that they were unable to obtain or calculate SDs.
  - (Quality of evidence: very low [using GRADE])

Authors' conclusion

"We found no clear evidence for multicomponent interventions compared to the control condition. (p. 24)"[6]

Raveel and Schoenmakers, (2019),[10] Belgium

Main study findings

- Study 1 (Arnetz et al., 2000), RCT
  - Setting: EDs, geriatric, psychiatric, home health care (Sweden)
  - Intervention: structured feedback program
  - Control: no structural feedback program.
  - Result: The intervention resulted in better awareness of risk assessment and how to deal with aggressive patients. (Quality of evidence: low [using GRADE]).
  - Findings with respect to risk of episodes of aggression were not reported in this SR, but were reported in the SR by Geoffrian et al.[9] that is included in the current report.
- Study 2 (Kowalenko et al. 2012), review of WPV
  - Setting: ED (US)
  - Intervention: training (and modifications in ED physical structure and security; and policy changes).
  - Result: Training increased knowledge and confidence to handle violence, however this did not lead to reduction in assaults.
  - Quality of evidence: low [using GRADE-CER-Qual]).
- Study 3 (Kynoch et al. 2011), SR
  - Setting: Acute hospital setting, nursing ICU, ED.
  - Intervention: Staff training, pharmacological treatment, and mechanical restraint.
  - Result: Training increased knowledge, skill, and confidence to handle aggressive situations (Quality of evidence: low).
  - Medication reduces the incidence of aggressive patient behaviour in the acute care setting (Quality of evidence: moderate).
  - Mechanical restraints resulted in minimal complications when used for short times in the acute care setting (Quality of evidence: low).

Authors' conclusion

"This review documented interventions to prevent and de-escalate aggression against doctors. Aggression against physicians is a serious occupational hazard. There is moderate evidence that an integrated violence prevention programme decreases the risks of patient-to-worker violence. The review failed to gather sufficient numerical data to perform a meta-analysis. A large-scale cohort study would add to a better understanding of the effectiveness of interventions. (p. 1 of 20)"[10]

D'Ettorre et al. (2018),[11] Italy

Main study findings

- Study 1 (Wu et al. 2015); study type NR.
  - Setting: ED (country NR)
  - Result: Training based only on lectures was less effective in preventing WPV compared with training programs in hospital settings based on interactive and dynamic learning methods for ED workers.

Authors' conclusion

"A strategic way to the effective management of WPV should prioritize training courses focused on constructing HCW-patient relationship, improving the workers' communication skills, accurate reporting of each violent incident, and improving the labor context through management commitment and employee involvement in WPV prevention programs. A special effort is required in implementing workplace design effective in minimizing stressful conditions in waiting rooms which turned out to be the most frequent site of assaults. (p. 29)".[11]

Weiland et al. (2017),[12] Australia

Main study findings

- Study 1 (Calihol et al. 2007), interrupted time series (5 months pre and 5 months post).
  - Setting: Emergency psychiatric department in 1 hospital (Switzerland)
  - Intervention: Education and dialogue
  - Result: There was a significant reduction in violent behaviour with the intervention. Violent behaviour was 17% pre-intervention, and 7% post-intervention; P value was not reported. The measure used was the percentage of violent patients as a function of total presentations, not the rate of violent behaviour. Hence it should be noted that more than 1 assault could have come from the same patient.
- Study 2 (Gillespie et al. 2014), controlled trial (quasi-experimental, 9 months pre and 9 months post).
  - Setting: 2 level 1 trauma centers, 2 urban tertiary care EDs, and 2 community-based suburban EDs (country NR).
  - Intervention: environmental changes, policies and procedures, and education and training.
  - Result: Assault rate decreased significantly over time for both the intervention and control groups (P values NR).
- Study 3 (McMohan et al. 2003), interrupted time series (pre: January-July 2000; post: 2001, dates not specified).
  - Setting: Urban level 1 trauma centre in the US.
  - Intervention: Modified restraint documentation tool and training.
  - Result: Restraint episodes after implementation of the intervention decreased from 37 per month to 21 per month. Duration of restraint decreased from 2.3 hours to 1.9 hours.
- Study 4 (Emde et al. 2002), retrospective audit of an interrupted time series (pre: March to May, post: October to December 2001).
  - Setting: ED of a level III community hospital in the US.
  - Intervention: Education, safety modifications to seclusion room and improved restraint documentation.
  - Result: Fewer restraints were used after implementation of the intervention (restraint use decreased from 20 per month to 7 per month) with no increase in staff injury.
  - Quality of evidence of the above studies were weak (according to the EPHPP Quality Assessment tool)[23]

Authors' conclusion

"There is an unambiguous gap in the literature regarding the efficacy of interventions for ABD management in EDs involving environmental, policy or practice-based changes. With growing

demand on EDs, and with increasing numbers of ABDs, identification of robust evidence-based interventions for safe and effective ABD management is vital. (p. 647)".[12]

Gaynes et al. (2016),[14] US

Main study findings

- Study 1 (Bieniek et al.1998), RCT, N (patients) = 20; duration of study was 3 hours from baseline through post-intervention or longer-term follow-up.
  - Setting: psychiatric emergency service, US
  - Intervention 1: haloperidol + lorazepam
  - Intervention 2: lorazepam
  - Result: Significantly shorter time to Overt Aggression Scale (OAS) improvement with haloperidol plus lorazepam compared with lorazepam alone P = 0.028); risk of bias (ROB): low; strength of evidence (SOE): insufficient.
  - Significantly greater improvement (i.e., decrease of 4 or more points) in OAS scores of aggressive or agitated behaviour at 60 minutes with haloperidol plus lorazepam (100%) compared with lorazepam alone (55%), P = 0.03; ROB: low; SOE: insufficient.
  - No medication adverse effects were reported with either haloperidol plus lorazepam or lorazepam alone. ROB: low; SOE: insufficient
- Study 2 (Richards et al.), RCT, N (patients) = 202; duration of study (from baseline through post-intervention or longer-term follow-up) was 60 minutes.
  - Setting: large urban university ED, US.
  - Intervention 1: droperidol
  - Intervention 2: lorazepam
  - Result: Significantly lower mean sedation scores (i.e., less combative, violent, or out of control behaviour) at various time points (10, 15, 30, and 60 minutes) with droperidol compared with lorazepam (P < 0.001 for each time point); ROB: high; SOE: insufficient.
  - No significant differences in reduction of any vital signs between droperidol and lorazepam (P > 0.05); ROB: high; SOE: insufficient.
- Study 3 (Villari et al.), NRCT, N (patients) = 101; duration of study (from baseline through post-intervention or longer-term follow-up) was 72 hours.
  - Setting: psychiatry emergency service, US]
  - Intervention 1: risperidone
  - Intervention 2: olanzapine
  - Intervention 3: quetiapine
  - Intervention 4: haloperidol
  - Result: No significant differences between the interventions with respect to changes in mean total Modified OAS scores from baseline to 72 hours was reported (changes in scores were −7.3, −6.3, −7.9, and −9.4 for risperidone, olanzapine, quetiapine, and haloperidol respectively), P = NR; ROB: medium; SOE: insufficient.
  - Medication side effects (abnormal gait, dizziness, extrapyramidal events, headache, hypotension, and somnolence) were generally few and not significant (P ranging from 0.012 to 0.964); ROB: medium; SOE: insufficient.
  - Note: Definition of SOE grade insufficient: "We have no evidence, we are unable to estimate an effect, or we have no confidence in the estimate of effect for this"

- Study 4 (D'Orio et al. 2004), pre- and post-study, N (patients): NR.
  - Setting: psychiatry emergency service, US. Length of follow-up was 18 months.
  - Intervention: multimodal (includes staff training).
  - Control: usual care before intervention
  - Result: mean episodes of seclusion and restraint per month decreased by 41.5%, from 65 to 38 (P < 0.001)
- Study 5 (Forster et al. 1999), pre- and post-study; sample size (number of admissions) = 5,570, but it was unclear how many of these admissions were re-admissions; N (patients) = 3,010. Length of follow-up = 24 months.
  - Setting: Urban acute care inpatient psychiatric hospital (psychiatric emergency service and 4 locked inpatient wards), US
  - Intervention: multimodal (includes staff training), N (patients) = 3,010
  - Comparator: usual care, N (patients) = 2,560
  - Result: Total annual rate of restraint decreased by 13.9% overall, from 2,379 episodes per 2,560 admissions, to 2,380 episodes per 3,010 admissions.
  - Average duration of seclusion or combination of seclusion and restraint per episode decreased by 54.7% from 13.9 hours per episode to 6.3 hours per episode.
  - Staff injuries were reduced by 18.8%, from 48 to 39.
  - Statistical significance of pre- and post-changes were not reported.
  - (Note: for pre- and post-studies, quality assessments were not conducted)

Authors' conclusion

"The current evidence base leaves clinicians, administrators, policymakers, and patients without clear guidance on how to best prevent and de-escalate aggressive behaviors in acute care settings. […] More research is needed to guide clinicians, administrators, and policymakers on how to best prevent and de-escalate aggressive behavior in acute care settings. (p. 70)"[14]

Ramaciatti et al. (2016),[13] Italy.

Main study findings

- Study 1 (Gillespie et al. 2014), quasi-experimental study
  - Setting: EDs (2 level 1 trauma centers, 2 urban tertiary care Eds, and 2 community-based suburban EDs) in the US
  - Intervention: comprised of 3 components (environmental changes; policies and procedures; and education and training).
  - Result: In the intervention group there was a significant decrease in assault rates from pre- to post-intervention (P value NR) and this was also observed in the control group (not described). The hypothesis that the intervention would result in a significantly greater decrease in WPV episodes compared to control was not supported.
- Study 2 (Kowalenko et al. 2012), review
  - Setting: ED (details not presented)
  - Intervention: training and modifications in ED physical structure and security; and policy changes.
  - Result: No decrease in assaults was demonstrated; there is lack of evidence regarding the effectiveness of the interventions

Authors' conclusion

"The studies that have attempted to evaluate the effectiveness of interventions have shown weak evidence to date. Further research is needed to identify effective actions to promote a safe work environment in the ED. (p. 17)"[13]

Appendix 5: Overlap Between Included Systematic Reviews

Table 4: Overlap in Relevant Primary Studies Between Included Systematic Reviews

Primary study citation	Geoffrian et al. (2020)[9]	Spelten et al. (2020)[6]	Raveel and Schoenmaker, (2019)[10]	D'Ettorre et al. (2018)[11]	Weiland et al. (2017)[12]	Gaynes et al. (2016)[14]	Ramacciati et al. (2016)[13]
Arnetz et al. Journal of Advanced Nursing 2000;3(3):668-80.	Yes	No	Yes	No	No	No	No
Bieniek et al. Pharmacotherapy. 1998;18(1):57-62.	No	No	No	No	No	Yes	No
Calihol et al. Gen Hosp Psychiatry. 2007;29(1):42-4.	No	No	No	No	Yes	Yes	No
D'Orio et al. Psychiatr Serv. 2004;55(5):581-3.	No	No	No	No	No	Yes	No
Emde and Merkl, Emerg Nurs. 2002;28(4):320-2.	No	No	No	No	Yes	No	No
Forster et al. Arch Psychiatr Nurs. 1999 Oct;13(5):269-71.	No	No	No	No	No	Yes	No
Gillespie et al.. Journal of Emergency Nursing 2014;40(6):586-591.	No	Yes	No	No	No	No	Yes
Gillespie et al. Journal of Emergency Nursing 2013;39(4):376-83.[a]	No	No	No	No	Yes	No	No
Kowalenko et al. J Emerg Med. 2012;43(3):523–531.	No	No	Yes	No	No	No	No
Kynoch et al. Worldviews Evid Based Nurs 2011; 8: 76-86.	No	No	Yes	No	No	No	No
McMohan and Fisher. Dimens Crit Care Nurs. 2003;22(5):227-9.	No	No	No	No	Yes	No	No
Richards et al. J Emerg Med. 1998;16(4):567-73.	No	No	No	No	No	Yes	No
Villari et al. Prog Neuropsychopharmacol Biol Psychiatry. 2008; 15;32(2):405-13.	No	No	No	No	No	Yes	No

Primary study citation	Geoffrian et al. (2020)[9]	Spelten et al. (2020)[6]	Raveel and Schoenmaker, (2019)[10]	D'Ettorre et al. (2018)[11]	Weiland et al. (2017)[12]	Gaynes et al. (2016)[14]	Ramacciati et al. (2016)[13]
Wu et al. 2015, J Occup Health 2015; 57: 540-7.	No	No	No	Yes	No	No	No

[a]This is another publication of the study by Gillespie et al. 2014. In the text the authors had indicate 2014 as the year, whereas in the reference list the 2013 publication was listed. The results reported appear to be from the 2014 publication.