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Organisational interventions for preventing and minimising aggression directed towards healthcare workers by patients and patient advocates (Review)

Spelten E, Thomas B, O'Meara PF, Maguire BJ, FitzGerald D, Begg SJ

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[Intervention Review]

Organisational interventions for preventing and minimising aggression directed towards healthcare workers by patients and patient advocates

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ABSTRACT

Background

Workplace aggression is becoming increasingly prevalent in health care, with serious consequences for both individuals and organisations. Research and development of organisational interventions to prevent and minimise workplace aggression has also increased. However, it is not known if interventions prevent or reduce occupational violence directed towards healthcare workers.

Objectives

To assess the effectiveness of organisational interventions that aim to prevent and minimise workplace aggression directed towards healthcare workers by patients and patient advocates.

Search methods

We searched the following electronic databases from inception to 25 May 2019: Cochrane Central Register of Controlled Trials (CENTRAL) (Wiley Online Library); MEDLINE (PubMed); CINAHL (EBSCO); Embase (embase.com); PsycINFO (ProQuest); NIOSHTIC (OSH-UPDATE); NIOSHTIC-2 (OSH-UPDATE); HSELINE (OSH-UPDATE); and CISDOC (OSH-UPDATE). We also searched the ClinicalTrials.gov (www.ClinicalTrials.gov) and the World Health Organization (WHO) trials portals (www.who.int/ictrp/en).

Selection criteria

We included randomised controlled trials (RCTs) or controlled before-and-after studies (CBAs) of any organisational intervention to prevent and minimise verbal or physical aggression directed towards healthcare workers and their peers in their workplace by patients or their advocates. The primary outcome measure was episodes of aggression resulting in no harm, psychological, or physical harm.

Data collection and analysis

We used standard Cochrane methods for data collection and analysis. This included independent data extraction and 'Risk of bias' assessment by at least two review authors per included study. We used the Haddon Matrix to categorise interventions aimed at the victim, the vector or the environment of the aggression and whether the intervention was applied before, during or after the event of aggression. We used the random-effects model for the meta-analysis and GRADE to assess the quality of the evidence.

Main results

We included seven studies. Four studies were conducted in nursing home settings, two studies were conducted in psychiatric wards and one study was conducted in an emergency department.

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Interventions in two studies focused on prevention of aggression by the vector in the pre-event phase, being 398 nursing home residents and 597 psychiatric patients. The humour therapy in one study in a nursing home setting did not have clear evidence of a reduction of overall aggression (mean difference (MD) 0.17, 95% confidence interval (CI) 0.00 to 0.34; very low-quality evidence). A short-term risk assessment in the other study showed a decreased incidence of aggression (risk ratio (RR) 0.36, 95% CI 0.16 to 0.78; very low-quality evidence) compared to practice as usual.
Two studies compared interventions to minimise aggression by the vector in the event phase to practice as usual. In both studies the event was aggression during bathing of nursing home patients. In one study, involving 18 residents, music was played during the bathing period and in the other study, involving 69 residents, either a personalised shower or a towel bath was used. The studies provided low-quality evidence that the interventions may result in a medium-sized reduction of overall aggression (standardised mean difference (SMD -0.49, 95% CI -0.93 to -0.05; 2 studies), and physical aggression (SMD -0.85, 95% CI -1.46 to -0.24; 1 study; very low-quality evidence), but not in verbal aggression (SMD -0.31, 95% CI; -0.89 to 0.27; 1 study; very low-quality evidence).
One intervention focused on the vector, the pre-event phase and the event phase. The study compared a two-year culture change programme in a nursing home to practice as usual and involved 101 residents. This study provided very low-quality evidence that the intervention may result in a medium-sized reduction of physical aggression (MD 0.51, 95% CI 0.11 to 0.91), but there was no clear evidence that it reduced verbal aggression (MD 0.76, 95% CI -0.02 to 1.54).
Two studies evaluated a multicomponent intervention that focused on the vector (psychiatry patients and emergency department patients), the victim (nursing staff), and the environment during the pre-event and the event phase. The studies included 564 psychiatric staff and 209 emergency department staff. Both studies involved a comprehensive package of actions aimed at preventing violence, managing violence and environmental changes. There was no clear evidence that the psychiatry intervention may result in a reduction of overall aggression (odds ratio (OR) 0.85, 95% CI 0.63 to 1.15; low-quality evidence), compared to the control condition. The emergency department study did not result in a reduction of aggression (MD = 0) but provided insufficient data to test this.

Authors' conclusions

We found very low to low-quality evidence that interventions focused on the vector during the pre-event phase, the event phase or both, may result in a reduction of overall aggression, compared to practice as usual, and we found inconsistent low-quality evidence for multi-component interventions. None of the interventions included the post-event stage.
To improve the evidence base, we need more RCT studies, that include the workers as participants and that collect information on the impact of violence on the worker in a range of healthcare settings, but especially in emergency care settings. Consensus on standardised outcomes is urgently needed.

PLAIN LANGUAGE SUMMARY

Programmes, policies and work practices that reduce aggression by patients towards healthcare workers

Aim of the review

The aim of this review is to investigate the effectiveness of interventions, such as programmes, policies or work practices, at preventing and reducing aggression towards healthcare workers by patients and the individuals supporting patients.

Key messages

There is limited evidence that some interventions might reduce aggression towards healthcare workers. The available evidence is considered to be low- or very-low quality. This means we cannot be confident in the results. Most of the studies are set in nursing homes or in psychiatric wards of hospitals.

What was studied in the review?

We searched for studies that evaluated the effectiveness of interventions, such as programmes, polices or work practices for preventing or reducing aggression towards healthcare workers. We included seven studies in the review. The studies used a variety of interventions that took place in nursing homes, psychiatric wards of hospitals and a hospital emergency department.

Main results

In nursing home settings, two interventions produced mixed results with a medium reduction in overall aggression towards healthcare workers, but no consistent reduction in either physical or verbal aggression. The interventions were playing music during bathing times, and using specific bathing techniques. A person-centred culture led to a moderate reduction in physical aggression but not in verbal aggression. A humour clown intervention did not produce clear evidence of a reduction in aggression.
In the psychiatric setting, there was only one intervention, a regular risk assessment of patients, that showed a reduction in aggression towards healthcare workers. A multicomponent intervention on policy, environment, and work practices did not produce clear evidence of a reduction in aggression.

In the emergency department there was one intervention that involved changes to policies and procedures, the physical environment and education and training but it did not have an effect on aggression.

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No studies reported any harmful effects as a result of their interventions.

We rated the overall quality of the evidence as very low. The studies either had problems with their design or they did not describe their design in enough detail. Each of the studies measured different outcomes which resulted in a lack of consistency between them.

How up-to-date is this review?

The search of the review is current to 25 May 2019. Any studies published after this date are not included in the review.

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SUMMARY OF FINDINGS

Summary of findings 1. Vector-directed intervention at pre-event compared to practice as usual for preventing aggression directed towards healthcare workers by patients and patient advocates

Vector-directed intervention at pre-event compared to practice as usual for preventing aggression directed towards healthcare workers by patients and patient advocates

Patient or population: healthcare workers
Setting: nursing home and psychiatry
Intervention: vector pre-event
Comparison: practice as usual

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Quality of the evidence (GRADE)	Comments
	Risk with PAU	Risk with vector pre-event				
Overall aggression assessed with: Cohen-Mansfield Aggression Inventory Scale from: 0 to infinite Follow-up: mean 26 weeks	The mean overall aggression change score was 0.1	MD change score 0.17 higher (0.00 to 0.34 higher)	-	209 (1 RCT)	⊕⊕⊖⊖ Very low [a,b]	Larger change score means less violence
Overall aggression assessed with: number of aggressive incidents Follow-up: mean 30 weeks	7222 per 1000	2600 per 1000 (1156 to 5633)	Risk ratio 0.36 (0.16 to 0.78)	20 (1 RCT)	⊕⊖⊖⊖ Very low [a,b]	

*__The risk in the intervention group__ (and its 95% confidence interval) is based on the assumed risk in the comparison group and the __relative effect__ of the intervention (and its 95% CI).

CI: confidence interval; **MD**: mean difference; **PAU**: practice as usual; **RCT**: randomised controlled trial

GRADE Working Group grades of evidence
High quality: further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: we are very uncertain about the estimate.

[a]Downgraded one level because of possible selection bias.
[b]Downgraded two levels because small sample size (< 400) and one study only.

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Summary of findings 2. Vector-directed intervention at event compared to practice as usual for minimising aggression directed towards healthcare workers by patients

Vector-directed intervention at event compared to practice as usual for minimising aggression directed towards healthcare workers by patients and patient advocates

Patient or population: healthcare workers

Setting: nursing home
Intervention: vector-directed at event: playing music during bathing, special bathing techniques
Comparison: practice as usual

Outcomes	Anticipated absolute effects* (95% CI)		№ of participants (studies)	Quality of the evidence (GRADE)	Comments
	Risk with PAU	Risk with vector event			
Overall aggression assessed with: number of aggressive incidents/CMAI Scale from: 0 to infinite Follow-up: mean 8 weeks	-	SMD 0.49 lower (0.93 lower to 0.05 lower)	82 (2 RCTs)	⊕⊕⊖⊖ Low[a,b]	Indication of size of the effect: SMD of 0.20 is small effect, SMD of 0.40 is moderate effect and SMD of 0.80 is large effect
Physical aggression assessed with: CMAI Scale from: 0 to infinite Follow-up: mean 12 weeks	-	SMD 0.85 lower (1.46 lower to 0.24 lower)	46 (1 RCT)	⊕⊖⊖⊖ Very Low	
Verbal aggression assessed with: CMAI Scale from: 0 to infinite Follow-up: mean 12 weeks	-	SMD 0.31 lower (0.89 lower to 0.27 higher)	46 (1 RCT)	⊕⊖⊖⊖ Very Low[c,d]	

*__The risk in the intervention group__ (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: confidence interval; **CMAI**: Cohen-Mansfield Agitation Inventory; **PAU**: practice as usual; **RCT**: randomised controlled trial; **SMD**: standardised mean difference

GRADE Working Group grades of evidence
High quality: further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: we are very uncertain about the estimate.

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[a]Downgraded one level because of risk of bias: cross-over trials without washout period and unclear random sequence generation.
[b]Downgraded one level because of small sample size (< 400).
[c] Downgraded with one level because of risk of bias: cross-over trial without washout period and unclear sequence generation.
[d] Downgraded wit two levels because of small sample size and single study.

Summary of findings 3. Vector-directed intervention at pre-event/event compared to practice as usual for preventing and minimising aggression directed towards healthcare workers by patients and patient advocates

Vector-directed intervention at pre-event/event compared to practice as usual for preventing and minimising aggression directed towards healthcare workers by patients and patient advocates

Patient or population: healthcare workers
Setting: nursing home
Intervention: vector-directed at both pre-event and event
Comparison: practice as usual

Outcomes	Anticipated absolute effects* (95% CI)		№ of participants (studies)	Quality of the evidence (GRADE)	Comments
	Risk with PAU	Risk with vector pre-event/event			
Physical aggression assessed with: CMAI Scale from: 0 to infinite follow-up: mean 2 years	The mean physical change score CMAI aggression was - 0.27	MD change score CMAI 0.51 higher (0.11 higher to 0.91 higher)	101 (1 observational study)	⊕⊖⊖⊖ Very low[a]	
Verbal aggression assessed with: CMAI Scale from: 0 to infinite follow-up: mean 2 years	The mean verbal change score CMAI aggression was - 0.58	MD change score CMAI 0.76 higher (0.02 lower to 1.54 higher)	101 (1 observational study)	⊕⊖⊖⊖ Very low[a]	

*__The risk in the intervention group__ (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: confidence interval; **CMAI**: Cohen-Mansfield Agitation Inventory; **PAU**: practice as usual; **MD**: mean difference

GRADE Working Group grades of evidence
High quality: further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: we are very uncertain about the estimate.

[a]Downgraded one level because of small sample size (< 400).

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Summary of findings 4. Multicomponent intervention compared to practice as usual for preventing and minimising aggression directed towards healthcare workers by patients

Multicomponent compared to practice as usual for preventing and minimising aggression directed towards healthcare workers by patients and patient advocates

Patient or population: healthcare workers
Setting: emergency department
Intervention: multiple interventions including policy and practice change and education
Comparison: practice as usual

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Quality of the evidence (GRADE)	Comments
	Risk with PAU	Risk with multi				
Overall aggression assessed with: aggression count Follow-up: mean 18 months	38 per 1000	0 per 1000 (0 to 0)	Not estimable	209 (1 observational study)	⊕⊖⊖⊖ Very low [a,b]	We could not obtain or calculate SDs. The change values were 0.04 for both the intervention and control groups.

***The risk in the intervention group** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: confidence interval; **SD**: standard deviation

GRADE Working Group grades of evidence
High quality: further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: we are very uncertain about the estimate.

[a]Downgraded one level because of CBA design.
[b]Downgraded one level because of small sample size (< 400).

Summary of findings 5. Multicomponent intervention compared to physical fitness for preventing and minimising aggression directed towards healthcare workers by patients

Multicomponent intervention compared to physical fitness for preventing and minimising aggression directed towards healthcare workers by patients

Patient or population: healthcare workers

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Setting: psychiatry
Intervention: multicomponent intervention
Comparison: physical fitness

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Quality of the evidence (GRADE)	Comments
	Risk with physical fitness	Risk with multi				
Overall aggression assessed with: PCC Follow-up: mean 24 weeks	804 per 1000	777 per 1000 (720 to 825)	OR 0.85 (0.63 to 1.15)	1609 (1 RCT)	⊕⊕⊖⊖ Low [a]	

*__The risk in the intervention group__ (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: confidence interval; **OR**: odds ratio; **PCC**: Patient-staff Conflict Checklist; **RCT**: randomised controlled trial

GRADE Working Group grades of evidence
High quality: further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: we are very uncertain about the estimate.

[a]Downgraded two levels because risk of bias due to unclear randomisation and blinding of outcome assessment.

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BACKGROUND

Description of the condition

Workplace aggression is becoming increasingly prevalent in health care, with serious consequences for both individuals and organisations (Dupré 2014; Hershcovis 2010). Aggression is defined as "behaviour that results in personal injury or destruction of property and which may take the form of psychological devaluation and degradation as well as physical harm" (Bandura 1976). Workplace aggression is a serious occupational hazard that is spread across many work sectors. No workplace is immune to workplace aggression, however some are at a higher risk than others (Cooper 2002; Gillespie 2010; Hills 2014; Nowrouzi 2016). Healthcare workers function in highly stressful environments, as well as caring for individuals in a physiological or psychological crisis, which results in these workers being at high risk of exposure to workplace aggression. Healthcare workers are increasingly becoming victims of aggressive behaviour from service users and other members of the public. Aggression towards healthcare workers from patients and their advocates is described as external aggression (Barling 2009; Kvas 2014; Nowrouzi 2016). Aggression in the form of bullying by co-workers is the subject of a separate Cochrane Review, and therefore will not be covered in this review (Gillen 2017).

In 2000, 4% of workers in the European Union reported that they had been subjected to physical aggression in the workplace from external sources (Paoli 2001). Recent studies report that up to 29% of healthcare workers have been subjected to physical aggression from patients, and 21.1% from patient advocates. Up to 95% of healthcare workers have reported being exposed to some form of aggression from patients, up to 50% from patient advocates and up to 40% from co-workers or supervisors within a six- to 24-month period (Alameddine 2015; Camerino 2008; Di Martino 2003; Hills 2013; Hills 2015; Merecz 2006; Nowrouzi 2016; Spector 2014).

The sources of this aggression are varied and not always clear. Common causes of aggression are distress and frustration, physiological imbalances, substance misuse and abuse, intoxication, and mental health conditions, such as dementia, anxiety, schizophrenia and suicidal ideation. Communication skills, and expectations of patients and their advocates may also lead to instances of aggression (Alameddine 2015; Gillespie 2010). Aggression manifests in many different ways and can range from mild verbal expressions of frustration through to extreme acts of physical harm, or homicide (Ford 2010; Gillespie 2010).

Aggression can have profound effects on the physical and psychological health of the perpetrator and the victim, as well as those who witness the behaviour (Liu 2013; NICE 2015). In addition, workplace aggression impacts on individuals, organisations and communities. At an individual level, occupational aggression can impact on physical and psychological health; from short-term effects, such as bruising or feelings of anger and fear, through to long-term effects, such as depression, broken bones and permanent disability (Alameddine 2015). Beyond the health effects on individuals, occupational aggression may also affect victims' finances and careers because of the need to take time off work due to illness or injury, and reduced job satisfaction and commitment to an organisation (Dupré 2014; Hershcovis 2010). At an organisational and community level, occupational aggression has an impact on the quality of service delivery, has economic costs in terms of the need to support and replace staff, and causes potential disruption to services to the community (Cooper 2002).

Workplace aggression is predominantly found in occupations where employees have unavoidable, direct contact with people in distress. As health care often involves the care of individuals in a physiological or psychological crisis, workplace aggression is highly prevalent (Liu 2013; Nowrouzi 2016). A distinguishing factor for healthcare environments is whether they are controlled or uncontrolled. A controlled environment refers to the predetermined work area that healthcare workers operate in, such as the emergency department or a ward in hospital. This is opposed to an uncontrolled environment which is not predetermined; rather it is an impromptu work space where the healthcare workers have little knowledge of the physical and social elements and must adapt themselves to suit the environment. Examples of healthcare workers who operate in an uncontrolled environment are paramedics, midwives and remote area nurses (Campeau 2008). Occupational aggression in health care is a highly researched phenomenon. Healthcare workers are regarded as one of the highest recipients of occupational aggression, exceeded only by those working as bartenders or in protective services (Buckley 2011; Harrell 2011; HSE 2016; Piquero 2013).

The prevalence of aggression in health care is difficult to measure accurately as the majority of workplace aggression is not reported. The low rate of reporting workplace aggression is a consequence of several factors that influence individuals in their decision. The most frequent factors associated with under-reporting are: staff viewing workplace aggression as an unavoidable part of the job; and the belief that reporting an incident will not result in any change. In line with the normalisation process theory, workplace aggression appears to have become normal and expected in everyday practice (Alameddine 2015; Martinez 2016; May 2009; Nowrouzi 2016). A lack of understanding about which incidents merit reporting and a lack of organisational support and responsiveness might also have an impact on the decision to report or not report aggression (Barling 2009; Kvas 2014; Nowrouzi 2016).

Another complication in assessing the prevalence of workplace aggression is the lack of consistent conceptual and operational definitions. Terms such as workplace harassment, workplace violence, workplace incivility, antisocial work behaviour, bullying, harassment, psychological abuse and emotional abuse are all similar and often overlapping alternatives used to describe workplace aggression. The term 'violence' is used inconsistently. Violence is either used interchangeably with aggression or differentiated as a form of workplace aggression that involves behaviours intended to cause physical harm. In this review, workplace aggression is used to encompass all terms referring to behaviours by patients and their advocates that may result in harm to healthcare workers. Organisations and researchers need a standard format for reporting aggression to improve monitoring and prevention (Barling 2009; Cooper 2002; Dupré 2014).

The majority of the research conducted in the healthcare field relates to the nursing profession, generally using self-reporting surveys. While this is the easiest method to identify the prevalence of workplace aggression, it has the limitations of recall bias and response bias, resulting in the conclusions potentially being flawed. This however, is still likely to be more reliable than organisational incident reporting systems (Hills 2013). Despite the difficulties in assessing the actual prevalence of aggression in

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health care, external aggression has been consistently reported as the most prevalent. Paramedics have also been studied. In the USA, paramedics were found to have a homicide rate of 1.1 cases per 100,000 workers per year, compared to a national average of 0.8 homicides per 100,000 workers per year (Maguire 2002). USA paramedics' non-fatal assault rate is 22 times higher than the USA national average (Maguire 2004; Maguire 2005).

Description of the intervention

In the past 15 years there has been a significant increase in the research and development of interventions to prevent and minimise workplace aggression. The International Labour Office (ILO), International Council of Nurses (ICN), World Health Organization (WHO) and Public Services International (PSI) launched a joint programme in 2000, and the National Institute for Occupational Safety and Health (NIOSH) 'Workplace Violence Initiative: Research and Implementation on workplace violence' began in 2002 (CDC 2014; Di Martino 2003). Interventions aimed at the prevention and minimisation of workplace aggression are generally grouped into three categories, each with a specific target: education and training; organisational interventions; and workplace design. Education and training is directed towards individual workers, teaching employees to anticipate, identify, and react to aggression in the workplace, as well as to develop the knowledge and skills in organisational approaches to prevent, minimise, manage and report incidents of aggression. Organisational interventions are directed towards organisations and communities. They involve developing programmes, policies, and work practices to prevent and minimise workplace aggression (Wassell 2009). These may alter either management or employee practices (Runyan 2000). Workplace design is directed towards the physical work environment and aims to identify the physical and environmental risk factors for workplace aggression, and design the workplace appropriately to reduce this risk.

This review focuses on organisational interventions and will not elaborate further on education and training or the physical environment.

How the intervention might work

The Haddon Matrix is used in the public health sector as a generic tool which may be tailored to suit specific contexts for the evaluation of injuries and the identification of interventions (Haddon 1980). This matrix provides a clear method of categorising intervention types into distinct stages. These stages are: pre-event, event, and post-event. The other dimension of the matrix can be used to separate interventions based on who or what they are aiming to address; this may be the victim (healthcare worker), the vector (patient or their advocate) or the environment (physical and social). These three factors have been identified as the main contributors to workplace aggression directed at healthcare workers (Haddon 1980; Martinez 2016).

Pre-event organisational interventions aim to prevent aggression from arising and de-escalate any potentially aggressive person or situation before that aggression is directed at other people. Event stage organisational interventions aim to take control of an aggressive person or situation to prevent any further harm. Post-event organisational interventions aim to ensure the health of those who were subject to aggression, respond appropriately to the aggressor and evaluate and respond to the event (Haddon 1980; Ramacciati 2016).

The following table is an example of the Haddon Matrix (Haddon 1980), applied to workplace aggression in health care. Each cell lists potential interventions for the specific stage of an incident and where the intervention will be directed. As the physical environment is the focus of a separate planned Cochrane Review, we have omitted it from the matrix.

Phase	Victim/healthcare worker	Vector/patient or their advocate	Social environment
Pre-event	Undertake steps to minimise risk of violence and aggression through improved situational awareness, sharing of information amongst healthcare workers and the early removal of potential weapons. Specific strategies may include: • risk assessments; • advance warning systems; and • removal of potential weapons or perpetrators.	Use signage, information pamphlets and social media to provide information to patients, friends and family to manage their expectations of the services provided and their behaviour towards healthcare workers. For instance: • informing patients of waiting times; • educating the public on the triage system; and • advertising visiting hours.	Create a work environment, through the provision of adequate resources and a strong regulatory framework, where healthcare workers are safe. For example: • mandatory police attendance in 'no-go' zones; • explicit presence of security staff; • adequate staffing; • not working alone; • limit access to or visibility of valuables and medications; and • legislative protection.
Event	Take appropriate actions to deal with emergent situations that minimise violence and aggression against healthcare workers. These include:	Have in place the policies and resources that clearly communicate that healthcare workers can take action to protect themselves. For example:	Have in place the legislative framework, policies and resources that make it clear that healthcare workers are able to take a range of protective actions. Options that could be considered include:

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	• fleeing the scene; • self-defence; • de-escalation; and • requesting help.	• physically or pharmacologically restrain violent or aggressive patients; and • initiate prosecution against perpetrators.	• security personnel attendance; • raising an alarm, seeking assistance, or using panic buttons; • police attendance.
Post-event	Utilise organisational processes to ensure that all incidents are reported and that follow-up services are utilised. These include: • report all incidents; • seek medical treatment, counselling and peer support as required; and • follow-up of incident outcomes.	Follow-up perpetrators of violent or aggressive behaviour. Actions that could be considered include: • barring patients or their advocates who have exhibited aggressive behaviour in the past; • consideration of 'zero tolerance' policies for some categories of perpetrators; and • determining the reasons for or triggers of violent or aggressive behaviour.	Endorse a range of formal actions following appropriate investigation of violent or aggressive incidents. Due regard could be given to: • prosecution when appropriate; • balancing the value of consistent reporting and further action against the perpetrator; and • completion of incident investigation, recommendations for change and feedback to all relevant parties.

(Gates 2011; Gaynes 2016; Haddon 1980; Hills 2015; Ramacciati 2016; Runyan 2000; SA Health 2016; Wassell 2009).

Why it is important to do this review

This review is one review in an intended set of three reviews, covering: education and training (Hills 2013); organisational interventions (this review); and workplace design (to be conducted). We will exclude from this review any interventions included in the education and training and workplace design reviews. Likewise, we have excluded any interventions aimed at reducing aggression as a form of workplace bullying between healthcare workers, as these have already been reviewed (Gillen 2017).

Healthcare workers and managers face significant challenges in accessing appropriate and relevant research, synthesis of research results and translation of results into specific health service contexts in regard to organisational interventions for occupational violence (Gaynes 2016).

The most critical reasons why the questions being asked in this review are important, is that this preventable issue is still negatively impacting healthcare workers, their fellow workers and families, the perpetrators of aggression, the bystanders to the incident, employers, insurance companies, governments and society in general (Cooper 2002; Dupré 2014; Hershcovis 2010; Liu 2013). An ideal workplace in this context is one where incidents of aggression are incredibly rare or rarely escalate to episodes of violence. This is currently not the case and there is scope to improve outcomes through well-designed, co-ordinated and targeted interventions aimed at individual work settings, and also at communities and society more broadly, through the development of policies, legal structures, practices and activities that result in safer workplaces (Victorian Auditor-General's Office 2015).

OBJECTIVES

To assess the effectiveness of organisational interventions that aim to prevent and minimise workplace aggression directed towards healthcare workers by patients and patient advocates.

METHODS

Criteria for considering studies for this review

Types of studies

We included randomised controlled trials (RCTs). In consideration of the complexity of conducting RCTs in work organisations, we also included cluster-RCTs and controlled before-and-after studies (CBAs). We excluded CBA studies if the groups were not reasonably comparable at baseline (Ryan 2013).

Types of participants

Studies into workplace aggression investigate different aspects of violence. In terms of the Haddon Matrix (Haddon 1980), the focus can be on:

1. the victim of the aggression: the healthcare worker;
2. the vector of the aggression: the patient or a patient advocate;
3. the environment in which the aggression takes place, e.g. the occurrence of violence in a specific healthcare setting, or ward.

We included studies on all three aspects. We included patients and patient advocates as participants. We included adult healthcare workers of any gender or profession who interact with patients, their advocates, or both as participants. This included at least: physicians and physician assistants; dentists; nurses and midwives; pharmacists; paramedics; allied health professionals (e.g. physiotherapists, occupational therapists, speech pathologists, speech and language therapists, medical imaging practitioners, oral hygienists, podiatrists, dietitians, opticians, audiologists); and healthcare support personnel (e.g. reception staff, healthcare aides or assistants, healthcare security

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personnel). We included any public or private health care facility or unit as the environment.

Types of interventions

We included any organisational intervention to prevent and minimise verbal or physical aggression directed towards healthcare workers and their peers in their workplace from patients or their advocates. We included studies where the control condition is no organisational intervention for the prevention and minimisation of workplace aggression, or a comparison with current practice.

There are many different types of interventions, aimed at different manifestations of aggression. For example, interventions may be aimed at preventing aggression, e.g. informing patients of waiting times, or the explicit presence of security staff. Interventions can also be aimed at reducing the impact of aggression, for example, de-escalation, or a protocol to call the police and leave the scene.

Below is a categorisation of possible types of interventions along with some examples.

1. Job design: adequate staffing, reducing access to cash, avoiding lone working.
2. Incident reporting: identification, immediate management, reporting (complete incident form), incident investigation, conclusion and management.
3. Procedures for raising an alarm or seeking assistance, such as panic buttons, mobile phones.
4. Organisational policies and procedures: legislative protection, zero tolerance policies, robust reporting systems, peer support for victims, on-site security, mandatory police attendance in 'no-go' zones, violence alert systems, training programmes, staffing rules.
5. A policy for physical restraint use in response to behaviour that is challenging or aggressive by patients or their advocates.
6. A policy for barring patients or their advocates who have exhibited aggressive behaviour in the past.
7. Ensuring patients are kept informed, to limit frustration and misunderstandings.

We included interventions that are mandatory or voluntary.

We excluded organisational interventions that consist of education or training, since they are the subject of another Cochrane Review (Hills 2015).

We excluded bullying by colleagues as this is also the subject of another Cochrane Review (Gillen 2017).

We excluded interventions on physical structures and devices as these will be the focus of a separate Cochrane Review.

We excluded chemical sedation for agitation as an organisational intervention. Chemical sedation was considered to be a clinical intervention and it is the subject of several other Cochrane Reviews. The outcome measures for the studies did not match those for our protocol, either assessing the duration of an aggressive episode or the reduction in an aggression score instead of measuring the number of episodes of aggression.

Types of outcome measures

Primary outcomes

1. Number of episodes of aggression resulting in no harm or injury, psychological harm or injury, or physical harm or injury.

Secondary outcomes

1. Personal knowledge, attitudes and skills relating to workplace aggression, including in relation to its prevention and minimisation.
2. Adverse personal and organisational outcomes attributable to incidents of workplace aggression (e.g. leave days taken, alterations to workforce participation, including changing work patterns or attrition, litigation and rehabilitation costs).

Reporting of the secondary outcomes listed here in the trial is not an inclusion criterion for the review.

Search methods for identification of studies

Electronic searches

We conducted a systematic literature search to identify relevant published and unpublished RCTs and CBAs. We adapted the search strategy we developed for PubMed (see Appendix 1) for use in the other electronic databases. We did not impose language restrictions. We intended to arrange for the translation of key sections of potentially eligible non-English language papers or we intended to arrange that people who are proficient in the publications' languages fully assess them for potential inclusion in the review, as necessary.

We searched the following electronic databases from inception to 25 May 2019.

- Cochrane Central Register of Controlled Trials (CENTRAL) (Wiley Online Library).
- MEDLINE (PubMed).
- CINAHL (EBSCO).
- Embase (embase.com).
- PsycINFO (ProQuest).
- NIOSHTIC (OSH-UPDATE).
- NIOSHTIC-2 (OSH-UPDATE).
- HSELINE (OSH-UPDATE).
- CISDOC (OSH-UPDATE).

Searching other resources

We also conducted a search of ClinicalTrials.gov (www.ClinicalTrials.gov), and the World Health Organization (WHO) trials portal (www.who.int/ictrp/en).

We checked reference lists of all primary studies and review articles for additional references. We intended to contact experts in the field to identify additional unpublished materials, but did not have enough resources to do so.

Data collection and analysis

Selection of studies

Two review authors (ES, BT) independently screened titles and abstracts of all the studies we found with our systematic search

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to identify studies for inclusion. The same review authors coded them as 'retrieve' (eligible or potentially eligible/unclear) or 'do not retrieve'. We retrieved the full-text study reports/publications and five review authors (ES, BT, PO, BM, SB) independently assessed the full text and identified studies for inclusion. Where studies were identified as being ineligible, we recorded the reason(s). We resolved any disagreement through discussion or, if required, we consulted a sixth review author (DF). We identified and excluded duplicates and collated multiple reports of the same study so that each study rather than each report is the unit of interest in the review. We recorded the selection process in sufficient detail to complete a PRISMA study flow diagram and 'Characteristics of excluded studies' table (Moher 2009).

Should our systematic searches have identified studies conducted by authors of this review, we intended to avoid conflict of interest by having all decisions concerning inclusion and exclusion made by review authors who were not involved with the study.

Data extraction and management

We used a study-specific data collection form for the collection of study characteristics, intervention details and outcome data (Appendix 2). All review authors piloted this on at least one study in the review. Two review author (ES, BT) extracted the following study characteristics from included studies.

1. Methods: study design, total duration of study, study location, study setting, withdrawals, and date of study.
2. Participants: N, mean age or age range, sex/gender, inclusion criteria, and exclusion criteria.
3. Interventions: description of intervention, comparison, duration, intensity, content of both intervention and control condition, and co-interventions.
4. Outcomes: description of primary and secondary outcomes specified and collected, and at which time points reported.
5. Notes: funding for trial, and notable conflicts of interest of trial authors.

All review authors (ES, BT, PO, BM, SB, DF), in three pairs of two, independently extracted outcome data from included studies. We noted in the 'Characteristics of included studies' table if outcome data were not reported in a usable way. We resolved disagreements by consensus or by involving a third and fourth review author. Two review authors (ES, BT) transferred data into the Review Manager 5 (RevMan) file (Review Manager 2014). We double-checked that data were entered correctly by comparing the data presented in the systematic review with the study reports. A third review author (PO) spot-checked study characteristics for accuracy against the trial report. Had we decided to include studies published in one or more languages in which our author team is not proficient, we intended to arrange for a native speaker or someone sufficiently qualified in each foreign language to fill in a data extraction form for us.

Assessment of risk of bias in included studies

All review authors (ES, BT, PO, BM, SB, DF), in three pairs of two, independently assessed risk of bias for each study using the criteria outlined in the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2011). We resolved any disagreements by discussion or by involving other review authors. We assessed the risk of bias according to the following domains.

1. Random sequence generation.
2. Allocation concealment.
3. Blinding of participants and personnel.
4. Blinding of outcome assessment.
5. Incomplete outcome data.
6. Selective outcome reporting.
7. Other bias.

We graded each potential source of bias as 'high', 'low' or 'unclear' and provided a quote from the study report together with a justification for our judgement in the 'Risk of bias' table. We summarised the 'Risk of bias' judgements across different studies for each of the domains listed. We considered blinding separately for different key outcomes where necessary (e.g. for unblinded outcome assessment, risk of bias for all episodes of aggression may be very different than for an adverse personal outcome). Where information on risk of bias relates to unpublished data or correspondence with a trialist, we noted this in the 'Risk of bias' table.

For CBAs, we assessed the studies against the same criteria as RCTs but reported them as being at high risk of bias on both the random sequence generation and allocation sequence concealment items.

Assesment of bias in conducting the systematic review

We conducted the review according to this published protocol and reported any deviations from it in the 'Differences between protocol and review' section of the systematic review.

Measures of treatment effect

We entered the outcome data for each study into the data tables in RevMan to calculate the treatment effects (Review Manager 2014). We used odds ratio (OR) or risk ratio (RR) for dichotomous outcomes, and mean differences (MDs) or standardised mean differences (SMDs) for continuous outcomes, or other type of data, as reported by the authors of the studies. If only effect estimates and their 95% confidence intervals (CIs) or standard errors (SEs) are reported in studies, we entered these data into RevMan using the generic inverse variance method. We ensured that higher scores for continuous outcomes have the same meaning for the particular outcome, explain the direction to the reader and report where the directions were reversed, if this was necessary. When the results could not be entered in either way, we described them in the 'Characteristics of included studies' table, or entered the data into additional tables.

Unit of analysis issues

For studies that employ a cluster-randomised design and that report sufficient data to be included in the meta-analysis, but do not make an allowance for the design effect, we calculated the design effect based on a fairly large assumed intracluster correlation of 0.10. We based this assumption of 0.10 being a realistic estimate by analogy on studies about implementation research (Campbell 2001). We followed the methods stated in the *Cochrane Handbook for Systematic Reviews of Interventions* for the calculations (Higgins 2011).

Dealing with missing data

We contacted investigators or study sponsors in order to verify key study characteristics and obtain missing numerical outcome data

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where possible (e.g. when a study is identified as abstract only). Where this was not possible, and the missing data are thought to introduce serious bias, we explored the impact of including such studies in the overall assessment of results by a sensitivity analysis.

If numerical outcome data were missing, such as standard deviations (SDs) or correlation coefficients, and they could not be obtained from the authors, we calculated them from other available statistics such as P values, according to the methods described in the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2011).

Assessment of heterogeneity

Based on Verbeek 2012, we assessed the homogeneity of the results of all included studies based on similarity of participants, intervention type, comparison type, outcome type and follow-up time.

We differentiated between interventions as they are categorised via the Haddon Matrix (Haddon 1980). We considered occupational groups as similar. We differentiated between physical and verbal aggression.

Where available, we categorised follow-up times of less than six months as short-term follow-up, six months to 12 months as medium-term follow-up, and greater than 12 months as long-term follow-up, and regarded these as being different.

We tested for statistical heterogeneity using the I^2 statistic (Higgins 2011), using the following as a rough guide for interpretation: 0% to 40% might not be important; 30% to 60% may represent moderate heterogeneity; 50% to 90% may represent substantial heterogeneity and 75% to 100%, considerable heterogeneity. In cases of substantial heterogeneity (defined as $I^2 \geq 50\%$), we explored the data further, including via subgroup analyses, in an attempt to explain the heterogeneity.

Assessment of reporting biases

If we were able to pool more than five trials in any single meta-analysis, we intended to create and examine a funnel plot to explore possible small-study biases.

Data synthesis

Using RevMan 5 software (Review Manager 2014), we pooled data and displayed the results in separate forest plots by primary study design (i.e. we analysed and displayed RCTs and CBAs separately) and we pooled data from studies judged to be homogeneous. If more than one study provided usable data in any single comparison, we performed a meta-analysis. When studies were statistically heterogeneous, we used a random-effects model. Otherwise, we used a fixed-effect model. When using the random-effects model, we conducted a sensitivity check by using the fixed-effect model to reveal differences in results. We included a 95% CI for all estimates.

When I^2 was higher than 75% we did not intend to pool results of studies in meta-analysis.

We intended to describe skewed data reported as medians and interquartile ranges narratively.

Where multiple trial arms were reported in a single trial, we intended to include only the relevant arms. If two comparisons were combined in the same meta-analysis, we halved the control group to avoid double-counting.

'Summary of findings' table

We created a 'Summary of findings' table using the number of episodes of aggression resulting in no harm or injury, psychological harm or injury, or physical harm or injury.

We used the five GRADE considerations (study limitations, consistency of effect, imprecision, indirectness and publication bias) for downgrading to assess the quality of a body of evidence. We intended to use the three factors for upgrading for non-randomised studies (large effect size, plausible confounding towards null, dose-response) but these were not applicable. We used methods and recommendations described in Section 8.5 and Chapter 12 of the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2011), using GRADEpro software (GRADEpro GDT 2015). We justified all decisions to downgrade the quality of RCTs or upgrade the quality of CBAs using footnotes and we made comments to aid readers' understanding of the review where necessary. We also compiled an additional GRADE table showing all our decisions about the quality of evidence and their justifications.

Subgroup analysis and investigation of heterogeneity

If we found a sufficient number of studies, we intended to carry out one or more of the following subgroup analyses where we identified substantial heterogeneity ($I^2 > 50\%$) among included studies.

1. Uncontrolled versus controlled work conditions.
2. Lone working/community-based working versus healthcare setting.
3. Variability in aggression based on client characteristics (e.g. mental health issue, health issue, relatives or bystander issues).

Sensitivity analysis

If we found sufficient studies, we intended to conduct a sensitivity analysis to test the robustness of our meta-analysis results by omitting studies that we judge to have a high risk of bias.

When using the random-effects model to combine data, we intended to conduct a sensitivity analysis by using the fixed-effect model to reveal differences in results.

Where we could not obtain missing numerical outcome data and we thought the missing data could introduce serious bias, we intended to explore the impact of including such studies in the overall assessment of results by a sensitivity analysis.

Reaching conclusions

We based our conclusions only on findings from the quantitative or narrative synthesis of included studies for this review. We avoided making recommendations for practice based on more than just the evidence, such as values and available resources. Our implications for research suggested priorities for future research and outlined what the remaining uncertainties are in the area.

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RESULTS

Description of studies

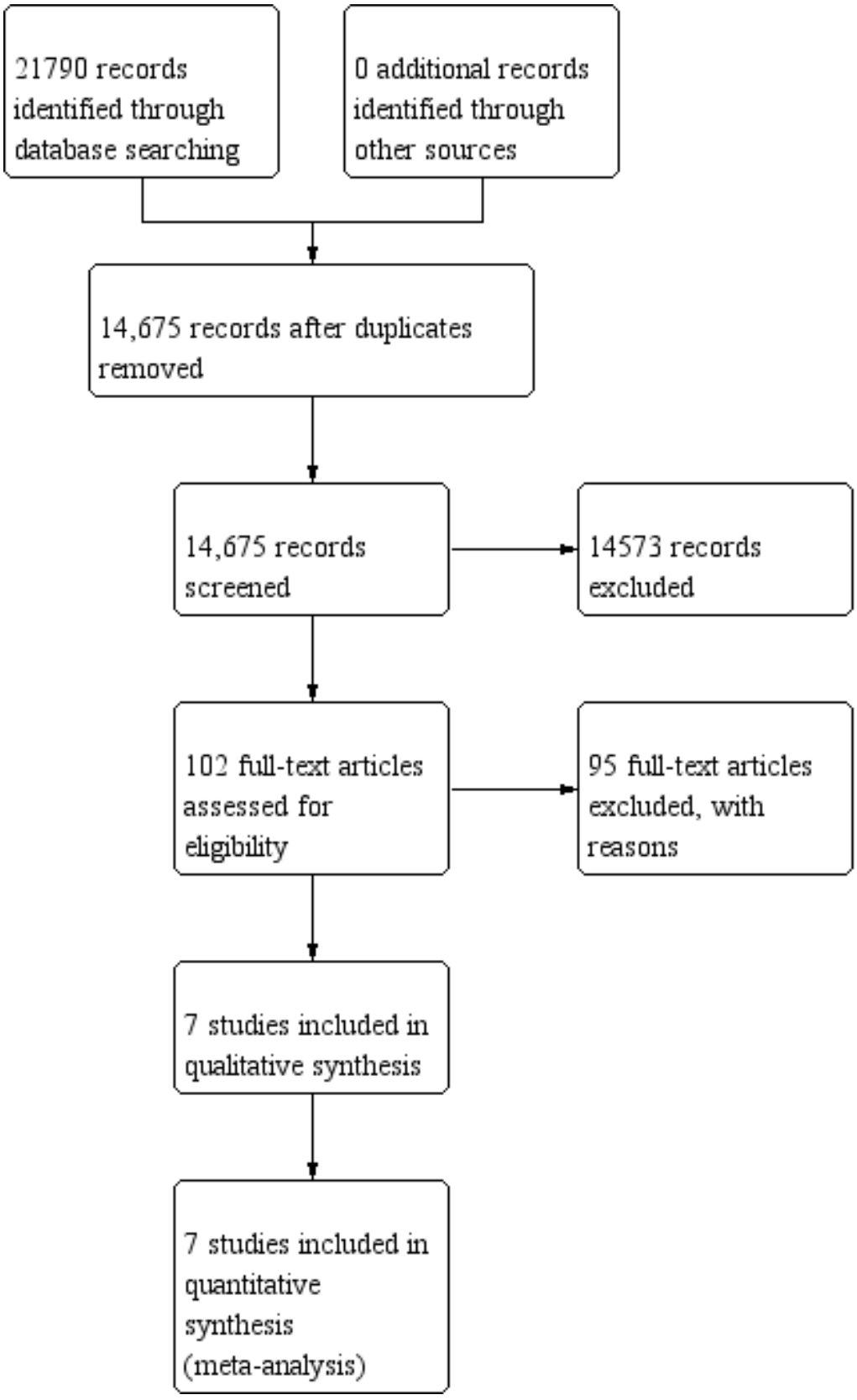
The selection process resulted in seven included studies. Four studies were conducted in the USA (Burack 2012; Clark 1998; Gillespie 2014; Sloane 2004), and the other three in Australia (Low 2014), the Netherlands (van de Sande 2011), and the UK (Bowers 2015). Four studies were conducted in nursing home settings, with their residents as participants (Burack 2012; Clark 1998; Low 2014; Sloane 2004), two studies were conducted at psychiatric wards with patients (van de Sande 2011) and patients and staff as participants (Bowers 2015). The final study was conducted in emergency departments (Gillespie 2014), with emergency department staff as participants.

Results of the search

The literature search resulted in 21,790 references. We removed 7115 duplicates and found 14,573 studies to be irrelevant during screening. We assessed 102 full-text studies for eligibility and excluded 95. We included seven studies in the review (Figure 1).

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Figure 1. Study flow diagram.



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Included studies

Design

Of the seven included studies, two studies used a controlled before-and-after (CBA) study design (Burack 2012; Gillespie 2014), three studies used a cluster-randomised controlled trial (RCT) design (Bowers 2015; Low 2014; van de Sande 2011), and the final two were cross-over RCTs (Clark 1998; Sloane 2004).

Sample size

Three studies had a smaller sample size of up to 101 participants (Burack 2012; Clark 1998; Sloane 2004), the other four had medium sample sizes, ranging between 200 and 400 participants (Bowers 2015; Gillespie 2014; Low 2014; van de Sande 2011).

Participants

In terms of the Haddon Matrix (Haddon 1980), in five studies, the participants in relation to the intervention were the vectors/patients.

The vectors in Burack 2012 were 101 elders in a nursing home in a large urban area in the USA; 51 in the intervention condition, 50 as the control group. The groups were significantly different on race and activities of daily living (ADL); the intervention group had a significantly higher percentage of white participants (70%) and were less ADL dependent. There were no differences between the groups for age, gender, length of time in the community, length of time in the nursing home, cognitive status, or number of disease diagnoses.

Clark 1998 was the smallest study with the participants as the vector. Here the vectors were 18 older adults (mean age 82, standard deviation (SD) 10, range 55 to 95; 14 women, 4 men), with severe levels of cognitive impairment in a nursing home in the South of the USA.

Low 2014 included residents of 35 nursing homes in and near Sydney, Australia as vectors. The intervention condition included 189 participants in 17 facilities and the control condition included 209 participants in 18 facilities. There were no significant differences in demographic characteristics between the groups.

van de Sande 2011 involved four acute psychiatric wards in and near Rotterdam, the Netherlands. Patients were the vector. During the baseline period, 170 patients were residents on the ward (80 in the intervention, 90 in the control group), during the intervention period there were 207 patients in the intervention group and 251 in the control group. In the baseline period there was no difference between the groups for age and gender, however patients in the experimental group were more often from an ethnic minority background, more often involuntarily admitted, and more likely to be diagnosed with a psychotic or a personality disorder. During the intervention period, the differences in the experimental group were the same, with the exception of the difference in ethnic background; the numbers of patients from ethnic minorities were similar in the two groups.

The Sloane 2004 study involved 15 nursing homes in the USA (9 in Oregon, 6 in North Carolina), with their residents as the vector. Five nursing homes were in the control group, 10 in the intervention group. For several reasons (drop out during the study, consent) only 23 nursing home residents (vectors) were included in the control group and 46 in the intervention group. The only difference between the groups was that the control residents were more often female, slightly less cognitively impaired, and more often visually impaired. In addition, the study included 13 nursing assistants in the control group and 24 in the intervention group. Both groups were similar in age, gender and length of employment.

The final two studies focused on both the vector/patient and the victim (Bowers 2015; Gillespie 2014).

The Bowers 2015 study included the victim (staff) and the vector (patients) in 31 randomly chosen acute psychiatric wards at 15 randomly chosen hospitals in the UK. Sixteen wards were assigned to the intervention, 15 to the control condition. The mean number of beds per ward was 19 (SD 3.96), the majority of wards served both male and female patients (N = 16). The modal age group of the participating staff was 40 to 49 (33.7%), a minority were white British (28.4%) and most were female (59.4%), which is typical of nursing staff in acute psychiatry in the south-east of England. The study did not report on absolute numbers of participants.

The study by Gillespie 2014 involved 209 staff members of six emergency departments (3 intervention, 3 control): two level 1 trauma centres, two urban tertiary emergency departments, and two community-based suburban emergency departments in the USA. Participants were primarily female (71%), nurses (56%) and working in a level 1 trauma centre (62%). The mean age was 37.3 years (SD 10.5, range 20 to 65). Most participants (86%) had been threatened or assaulted at least once during the 18 months of data collection.

Interventions

We organised all interventions in terms of the Haddon Matrix (Haddon 1980), see Table 1. As mentioned above, five studies focused their intervention on the vector, i.e. the patient, the other two focused their intervention on the vector/patient as well as the victim. In addition, we organised the interventions in relation to the phase of the event.

Interventions in two studies were vector-directed at the pre-event phase (Low 2014; van de Sande 2011). Both focused on the prevention of violence and aggression by nursing home patients and psychiatric patients, respectively. Low 2014 introduced humour therapy by professional 'Elder Clowns', augmented by resident engagement by trained staff called 'Laughter Bosses'. The intervention consisted of one day Laughter Boss training for nominated staff members on the evidence linking humour and health and practical ways for introducing humour in daily care. In addition, an Elder Clown, a trained performer with experience in healthcare settings, conducted between nine to 12 humour therapy sessions with available and willing residents. Elder Clowns tailored their interactions to maximise resident engagement. Controls received usual care. van de Sande 2011 introduced a short-term risk assessment tool: the Crisis Monitor. Patients were monitored daily by (trained) psychiatric nurses on the experimental wards by means of risk assessment scales from admission to discharge or transfer. The results were discussed during inter- and multidisciplinary meetings. In addition, the Broset Violence Checklist, the Kennedy Axis V, the Brief Psychiatric Rating Scale (BPRS), the Dangerousness Scale, and the Social Dysfunction and Aggression Scale were used (Almvik 2000; Kennedy 2003; Overall 1988; Baars 2006; Wistedt 1990). These five complementary scales

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covered a broad variety of common risk factors in acute psychiatric wards. In the control condition, treatment as usual was provided: unstructured psychiatric observations and treatment based on clinical judgement; no risk assessment tools were used.

Two studies evaluated interventions that were vector-directed at the event phase (Clark 1998; Sloane 2004). In both studies the event was possible agitation and aggression during bathing of the vector, the nursing home patient. Clark 1998 introduced recorded preferred music for patients with Alzheimer's during bathing episodes. Patients were randomly allocated to a bathing episode either with or without music. Following a two-week observation period (10 episodes), conditions were reversed. Similar to Clark 1998, the intervention by Sloane 2004 also focused on bathing time. The two non-pharmacological interventions involved person-centred bathing for nursing home residents with dementia. The first intervention is a towel bath: an in-bed bath method in which the caregiver uses two bath blankets, two bath towels, a no-rinse soap, and two quarts of warm water; keeps the resident covered at all times; and cleanses the body using gentle massage. The second intervention, person-centred showering, sought to individualise the experience for the resident by using a wide variety of techniques, such as providing choices, maintaining resident warmth, and distracting attention. There was cross-over between the experimental groups, and the control group received care as usual.

One intervention was vector-directed at the pre-event phase and the event phase (Burack 2012). In this study, the pre-event/event was possible aggression by a nursing home patient, the vector. Burack 2012 studied the impact of culture change on elders' behavioural symptoms. The culture change intervention consisted of a transformation of nursing home care from a traditional hospital model of care to a person-centred care model. Elements of the culture change were: (1) the creation of community co-ordinator positions, (2) education about the culture change model, (3) a flattening of the organisational and community structures, (4) meaningful activities and resident choice, (5) family involvement, (6) increased consistent staffing, and (7) environmental changes, for example more personalised rooms and redecorating of communal rooms to create a more homely and calm environment. The control communities, continued to function along the nursing home's pre-cultural change model.

Two studies developed multicomponent interventions that were vector-directed, victim-directed, and environment-directed, and included two phases: pre-event and event (Bowers 2015; Gillespie 2014). Both studies involved a comprehensive package of actions aimed at preventing violence, managing violence and environmental changes. Both included the vector (psychiatry patients and emergency department patients, respectively) as well as the victim (nursing staff in psychiatry and emergency departments, respectively). Bowers 2015 investigated the complex Safewards intervention. The intervention is targeted at nursing staff and consists of 10 interventions: (1) mutually agreed and publicised standards of behaviour for staff and patients, (2) short advisory statements ('soft words'), (3) de-escalation model used by the best de-escalator to expand overall skills, (4) saying something good about each patient at handover, (5) scanning for bad news for the patient from significant others and intervening promptly, (6) 'know each other' folder in patient day room for structured, shared, innocuous personal information between patients and staff, (7) regular patient meeting to bolster inter-patient support, (8) a crate of distraction and sensory modulation tools, (9) patient reassurance following potentially frightening incidents, and (10) display on the ward of positive messages from discharged patients. Wards in the control condition implemented a package of health promotion interventions directed at improving physical health of staff. Gillespie 2014 partnered with employees, managers, and hospital administration to develop their work place violence intervention, which consisted of three components: environmental changes, policies and procedures, and education and training. Implementation of all components took place over a three-month period.

Three studies had a short-term follow-up, three a medium-term and one study had a long-term follow-up. In one study, the control group was engaged in an alternative activity: a health promotion package directed at improving staff physical health (Bowers 2015), the control condition in the other six studies was practice or care as usual.

As can be seen in Table 1, there were no studies in which the interventions focused on the post-event phase.

Outcome measures

Four studies reported aggression as the rate of aggressive incidents (Bowers 2015; Clark 1998; Gillespie 2014; van de Sande 2011), but measured these in different ways. The number of incidents were based on: a self-report checklist used by observers at the end of each shift (Patient-Staff Conflict checklist, Bowers 2015); a self-report monthly survey (Gillespie 2014); or on self-reports using a staff-based aggression scale (van de Sande 2011). Target behaviours were observer-reported on a checklist developed for the purpose of the study (Clark 1998).

The rates of aggression reported varied from 3.8 per 100 workers per month, to 722 per 100 beds over 10 months, to 80 per 100 shifts over a two-month period, to 122 per 100 bathing episodes over a two-week period.

In the three other studies, the researchers used the score on the Cohen-Mansfield Agitation Inventory (CMAI) (Burack 2012; Low 2014), or an adaptation thereof (Sloane 2004). The overall scores on the CMAI ranged between 35 and 38. For the verbal agitation scale they ranged between 2.1 and 3.4, and for the physical agitation scale, they ranged between 1.5 and 2.9.

The rates of aggressive incidents were reported as a dichotomous outcome (Bowers 2015; Gillespie 2014; van de Sande 2011), or as the mean of incidents per worker/vector (Clark 1998). The scores on the checklists were reported as mean scores.

The risk of an aggressive incident was related to the number of workers (Gillespie 2014), the number of patients being aggressive (Burack 2012, Low 2014; Sloane 2004), the number of beds in a ward (van de Sande 2011), or the number of shifts where observations were made (Bowers 2015). We considered all these outcomes as similar enough to be combined, but we used standardised mean differences (SMDs) as the effect sizes for continuous outcomes.

Only one of the three cluster-RCTs adjusted for the clustering effect, and we used the generic inverse variance (GIV) method to input the data into RevMan (Low 2014). For the other two studies, we calculated the design factor based on the number of clusters and

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the cluster size, and inflated the confidence intervals (CIs) of the studies (Bowers 2015; van de Sande 2011).

Clark 1998 and Sloane 2004 used a cross-over design, but did not use a proper analysis, and we analysed the study as if it were a parallel trial. This leads to too wide CIs, but is the best estimate we could make of the effect size.

One study reported overall aggression, verbal aggression, and physical aggression separately (Sloane 2004), and another study reported verbal and physical aggression separately (Bowers 2015). The other studies reported only overall aggression.

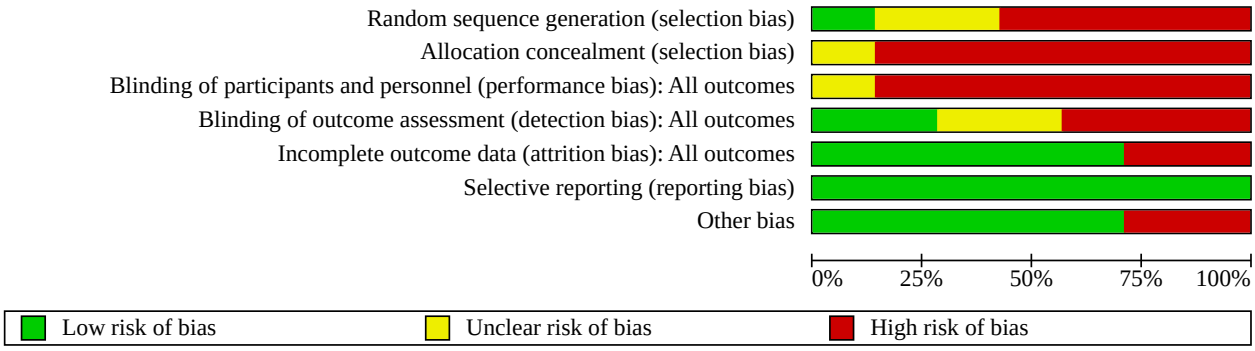
Excluded studies

After reading the full-texts, we excluded 95 studies. Of these, 39 studied chemical sedation for agitation, 24 had the wrong study design, 23 had the wrong intervention, five were duplicates, two had the wrong population, one measured the wrong outcomes and one was in the wrong setting (Figure 1).

Risk of bias in included studies

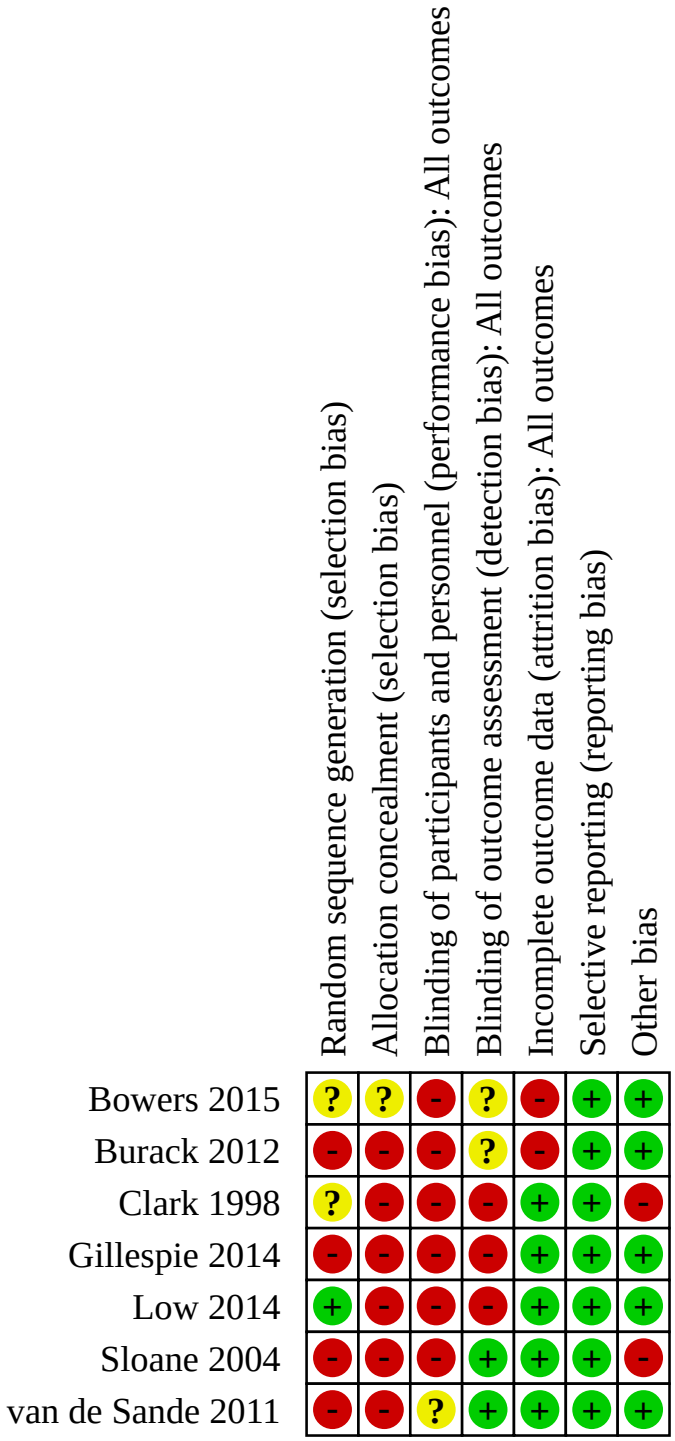
We judged studies to have an overall high risk of bias when there was a high risk of bias rating for random sequence generation, allocation concealment, and incomplete outcome data for the primary outcome measure (Figure 2; Figure 3).

Figure 2. Risk of bias graph: review authors' judgements about each risk of bias item presented as percentages across all included studies.



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Figure 3. Risk of bias summary: review authors' judgements about each risk of bias item for each included study.



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Two studies were CBA studies and therefore have a high risk of bias on both random sequence generation and allocation concealment (Burack 2012; Gillespie 2014). Based on the information provided in the publication, we considered the overall risk of bias to be high in one study (Burack 2012).

Allocation

Only one study described the random sequence allocation adequately (Low 2014). Two studies had a CBA design and we assessed them as high risk (Burack 2012; Gillespie 2014). Of the other four studies, we assessed two as unclear (Bowers 2015; Clark 1998), and two as high risk (Sloane 2004; van de Sande 2011).

Blinding

In one study (Bowers 2015), we assessed the blinding as unclear. Again, we assessed both studies with a CBA design as high risk (Burack 2012; Gillespie 2014). We assessed the four remaining studies as high risk, as no attempt at concealment was made or reported. Of these, two studies specifically reported on cross-contamination and increased awareness of staff and personnel about the intervention (Bowers 2015; Low 2014).

Incomplete outcome data

We assessed two studies as high risk due to reported loss to follow-up or missing data (Bowers 2015; Burack 2012). We assessed the other five studies at low risk of attrition bias.

Selective reporting

We did not detect any reporting bias and we assessed all studies at low risk as they appeared to have followed their protocol and design.

Other potential sources of bias

In the two cross-over RCTs, no mention is made of a washout period. No other sources of bias were reported or detected.

Effects of interventions

See: **Summary of findings 1** Vector-directed intervention at pre-event compared to practice as usual for preventing aggression directed towards healthcare workers by patients and patient advocates; **Summary of findings 2** Vector-directed intervention at event compared to practice as usual for minimising aggression directed towards healthcare workers by patients; **Summary of findings 3** Vector-directed intervention at pre-event/event compared to practice as usual for preventing and minimising aggression directed towards healthcare workers by patients and patient advocates; **Summary of findings 4** Multicomponent intervention compared to practice as usual for preventing and minimising aggression directed towards healthcare workers by patients; **Summary of findings 5** Multicomponent intervention compared to physical fitness for preventing and minimising aggression directed towards healthcare workers by patients

1. Vector-directed at pre-event versus practice as usual

1.1 and 1.2 Outcome: aggression incidents (medium-term follow-up)

Two studies, one using a continuous outcome and the other using a dichotomous outcome, evaluated interventions directed at the vector focused on the pre-event.

One study did not have clear evidence that their humour therapy intervention, involving trained clowns and laughter, decreased incidents (mean difference (MD) 0.17, 95% confidence interval (CI) 0.00 to 0.34; low-quality evidence; Analysis 1.1; Low 2014).

The other study found that their short-term risk assessment decreased incidents (risk ratio (RR) 0.36, 95% CI 0.16 to 0.78; low-quality evidence; Analysis 1.2; van de Sande 2011).

2. Vector-directed at event versus practice as usual

2.1. Incident scale (short-term follow-up)

2.1.1 Outcome: total aggression score

Two studies measured total aggression score. Both interventions focused on the vector, the nursing home patient. For both the event was bathing. In one intervention music was played during the bathing period (Clark 1998). The other had two arms: either a personalised shower or a towel bath was used during the bathing episode (Sloane 2004). The study with two arms evaluated similar vector- and event-directed interventions. We combined all three arms in a meta-analysis (standardised mean difference (SMD) -0.49, 95% CI -0.93 to -0.05; low-quality evidence; Analysis 2.1).

In addition, Sloane's vector-directed event intervention looked at physical and verbal aggression separately (Sloane 2004). The results are reported below.

2.1.2 Outcome: physical aggression

The personalised shower did not have clear evidence that it decreased physical aggression (SMD -0.76, 95% CI -1.59 to 0.08) while the towel bath decreased physical aggression (SMD -0.97, 95% CI -1.86 to -0.07). We combined these study results in a meta-analysis (SMD -0.85, 95% CI -1.46 to -0.24; very low-quality evidence; Analysis 2.1).

2.1.3. Outcome: verbal aggression

Neither intervention had clear evidence that they decreased verbal aggression: personalised shower (SMD -0.22, 95% CI -1.03 to 0.58) and towel bath (SMD -0.41, 95% CI -1.25 to 0.44). We combined these study results (SMD -0.31, 95% CI -0.89 to 0.27; very low-quality evidence; Analysis 2.1).

3. Vector-directed at pre-event/event versus practice as usual

3.1. Incident scale (long-term follow-up)

One study, using a continuous outcome, evaluated interventions directed at the vector, and focused on the pre-event and the event (Burack 2012). The intervention consisted of a two-year culture change. Elements of the culture change were: (1) the creation of community co-ordinator positions, (2) education about the culture change model, (3) a flattening of the organisational and community structures, (4) meaningful activities and resident choice, (5) family involvement, (6) increased consistent staffing, and (7) environmental changes, for example more personalised rooms and redecorating of communal rooms to create a more homely and calm environment.

3.1.1. Outcome: physical aggression

The culture change intervention decreased physical aggression (MD 0.51, 95% CI 0.11 to 0.91; very low-quality evidence; Analysis 3.1), on a scale ranging from -2 to 2.

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3.1.2. Outcome: verbal aggression

The culture change intervention did not have clear evidence for a decrease in verbal aggression (MD 0.76, 95% CI -0.02 to 1.54; very low-quality evidence; Analysis 3.1), on a scale ranging from -2 to 2.

4. Multicomponent versus practice as usual

4.1. Incident count (medium-term follow-up)

4.1.1 Outcome: overall aggression

One study, using a dichotomous outcome, evaluated multiple interventions directed at the vector and the victim and focused on the pre-event, the event and the environment. The authors partnered with employees, managers, and hospital administration to develop their work place violence intervention, which consisted of three components: environmental changes, policies and procedures, and education and training, aimed at all phases of violence, as described in the Haddon Matrix (Haddon 1980). The intervention did not result in a statistically significant effect on the occurrence of violent incidents (Gillespie 2014); the mean scores of the change intervention and of the control resulting in MD = 0. Unfortunately the paper did not provide information on SD or enough detail for additional calculations and the authors could not provide this information (Analysis 4.1).

5. Multicomponent intervention versus physical fitness

5.1. Incident count (short-term follow-up)

5.1.1. Outcome: overall aggression

One study compared a multicomponent intervention to a physical health fitness scheme directed at the vector and the victim and focused on the pre-event, event and environment. The intervention was the implementation of the complex Safewards intervention (Bowers 2015). The intervention was targeted at nursing staff and consisted of 10 components: (1) mutually agreed and publicised standards of behaviour for staff and patients, (2) short advisory statements ('soft words'), (3) de-escalation model used by the best de-escalator to expand overall skills, (4) saying something good about each patient at handover, (5) scanning for bad news for the patient from significant others and intervening promptly, (6) 'know each other' folder in patient day room for structured, shared, innocuous personal information between patients and staff, (7) regular patient meeting to bolster inter-patient support, (8) a crate of distraction and sensory modulation tools, (9) patient reassurance following potentially frightening incidents, and (10) display on the ward of positive messages from discharged patients. The physical fitness intervention consisted of a package of health promotion interventions directed at improving staff physical health. The Safewards intervention did not have clear evidence of decreased incidents of aggression compared to the physical fitness intervention (odds ratio (OR) 0.85, 95% CI 0.63 to 1.15; low-quality-evidence; Analysis 5.1; Bowers 2015).

DISCUSSION

Summary of main results

Two studies used a multistage intervention (Bowers 2015; Gillespie 2014), and included both the vector and the victim in their intervention. The other five studies focused on the vector in relation to the pre-event stage (Low 2014; van de Sande 2011), the event stage (Clark 1998; Sloane 2004), or both the pre-event and the event (Burack 2012). One study had an alternative intervention for the control condition (Bowers 2015), while all the other studies had care or practice as usual as their control condition. As can be seen from Table 1, no study focused on the post-event stage of the Haddon Matrix (Haddon 1980).

With regards to interventions focused on the vector and the pre-event, there was no clear evidence that the interventions (humour therapy in a nursing home setting and short-term risk assessments in psychiatry) may result in a reduction of overall aggression (mean difference (MD) 0.17, 95% confidence interval (CI) 0.00 to 0.34; Summary of findings 1).

With regards to interventions focused on the vector and the event, we found low-quality evidence that the interventions may result in a medium reduction of overall aggression (standardised mean difference (SMD) -0.49, 95% CI -0.93 to -0.05) and reduced physical aggression with the towel bath intervention (SMD -0.97, 95% CI -1.86 to -0.07), but did not have clear evidence for a reduction in physical aggression with the personalised shower intervention (SMD -0.76, 95% CI -1.59 to 0.08) or verbal aggression for both interventions (SMD -0.22, 95% CI -1.03 to 0.58 and SMD -0.41, 95% CI -1.25 to 0.44; Summary of findings 2). The interventions were the playing of preferred music and either a personalised shower or a towel bath, respectively. Both were conducted during the bathing of nursing home residents.

With regards to interventions focused on the vector and the pre-event and the event, we found very low-quality evidence that the intervention may result in a medium reduction of physical aggression (MD 0.51, 95% CI 0.11 to 0.91), but there was no clear evidence for a reduction in verbal aggression (MD 0.76, 95% CI -0.02 to 1.54; Summary of findings 3). The intervention involved a two-year culture change in a nursing home.

With regards to a multicomponent intervention compared to practice as usual, we found very low-quality evidence that the intervention may not result in a reduction of aggression (MD = 0; Summary of findings 4). The multicomponent intervention on several emergency departments, consisting of environmental changes, policy and practice changes and education and training, did not result in a reduction of violent incidents at emergency departments.

With regards to a multicomponent intervention compared to a physical fitness programme, there was no clear evidence that the intervention may result in a reduction of overall aggression (odds ratio (OR) 0.85, 95% CI 0.63 to 1.15; low-quality evidence; Summary of findings 5). The intervention was the Safewards programme consisting of 10 different elements to reduce conflict on psychiatric wards (Bowers 2015).

Overall completeness and applicability of evidence

The studies included in this review were conducted in Europe, Australia, and the USA only. Therefore, the generalisability of our findings to other parts of the world remains unclear.

With regards to the Haddon Matrix (Haddon 1980), we were unable to include studies that focused on the post-event stage. So no inference can be made with regards to the impact of interventions in this stage on the reduction of aggression against healthcare workers.

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Several components of the included studies further limit the generalisability of our results.

1. Four studies were conducted in a nursing home setting, and two on psychiatric wards. There was only one study set in emergency departments. This limits the generalisability of our findings to other healthcare settings.
2. The violence in both settings of nursing homes and psychiatric wards is likely to have a large mental health component, which limits the generalisability of our findings.
3. The mostly nursing home residents, are older in age and more likely to be female.
4. Most studies only looked at short- or medium-term follow-up of the impact of their intervention.
5. Only two studies distinguished between verbal and physical aggression; most looked at an overall measure for aggression.

Quality of the evidence

Of the seven studies, three were cluster-randomised controlled trials (RCTs), two were cross-over RCTs and two were controlled before-and-after (CBA) studies.

Overall, we rated the quality of the evidence as low to very low. The sample sizes were mostly small, leading to imprecision. Randomisation and allocation concealment were poorly described. Only one study reported on the method of randomisation (Low 2014). All other studies were at risk of selection bias. The blinding of participants and personnel was insufficient in all studies and unclear in one (van de Sande 2011). Randomisation at the individual level is difficult or impossible for organisational interventions. Most studies used cluster-randomisation, which would be the preferred design for these studies, but then did not correct for intracluster correlation. In one study the lack of reporting of detailed results prevented further analysis (Gillespie 2014). The cross-over studies did not appear to have included a washout period and lacked proper analysis. No study published an a priori protocol (Figure 2; Figure 3).

There was little to no consistency in the outcome measures used. Even when the same measure was used (the Cohen Mansfield Aggression Inventory), the results were not comparable due to differences in the use and application of the measure. In some studies incidents were related to number of patients, in others results they were related to wards or number of beds. Overall we would suggest that violent incidents should be related to workers, which should be administered in protocols.

Potential biases in the review process

It was difficult to define inclusion and exclusion criteria to properly focus on organisational interventions only. We had already excluded education and training interventions, as these are focused on the victim, and are also the subject of another Cochrane Review (Hills 2015). In the review process we decided to exclude chemical sedation interventions. There was a high number of these interventions, mostly in mental health settings. We argued that these interventions are a clinical intervention and they are already the subject of a number of Cochrane Reviews (Ahmed 2010; Baillon 2018; Huband 2010; Huf 2016; Khokhar 2016; Livingstone 2015; Martinón-Torres 2004; Ostinelli 2017;Ostinelli 2018a Ostinelli 2018b; Seitz 2011; Zaman 2017). The outcome measures used in all of the chemical sedation studies did not match those of our protocol.

Given the varied focus of the outcome measures in the included studies, we also used overall aggression as an outcome measure. This has not resulted in bias.

Given the lack of detail in outcome reporting, such as missing standard deviations (SDs) and lack of adjusting for effect of clustering, we calculated several outcomes anew. We believe that this aided better interpretation of the evidence and did not introduce bias.

For the nursing home settings, three of the four studies used the Cohen Mansfield Agitation Inventory (CMAI) (Burack 2012; Low 2014; Sloane 2004). The CMAI can be summarised into an overall scale and a scale for both verbal and physical agitation. In their overall scale, they combine aggressive and non-aggressive agitated behaviours. The overall scale thus diluted the effect of the intervention. However, the studies that separately reported physical and verbal agitation scores, showed similar effect sizes, thus we believe that this has not biased the results of our review.

We used the Haddon Matrix to categorise interventions because of its frequent use and because the Matrix can be used to summarise the main contributors to workplace aggression (Haddon 1980). There are other ways to categorise the interventions, but we felt that the use of the Haddon Matrix allowed for an informative summary of the results.

However, the Haddon-Matrix does not allow for specification of settings and the specific content of interventions. It might be that this should be better accounted for in the categorisation of interventions. For example, we found that multicomponent interventions had inconsistent results. Also, the majority of our studies were conducted in a limited number of healthcare settings with a strong focus on mental health issues: nursing homes, followed by psychiatric wards. This limitation does not become apparent in the categorisation in the Haddon Matrix (Haddon 1980). Therefore we specified to which setting the intervention and results applied, in our summary of results.

Overall, we believe that the included studies represent the best available evidence with regards to organisational interventions to reduce and prevent violence against healthcare workers by patients and patient advocates.

Agreements and disagreements with other studies or reviews

We were unable to find other systematic reviews on this topic. We did find three reviews that looked at workplace violence (Hassard 2019; Piquero 2013; Speroni 2014), however these reviews reported on the measurement of workplace violence and related costs and none looked at interventions.

AUTHORS' CONCLUSIONS

Implications for practice

We found very low to low-quality evidence that interventions focused on the vector in the pre-event phase, the event phase or both, may result in a reduction of overall aggression, compared to practice as usual.

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We found no clear evidence for multicomponent interventions compared to the control condition.

No interventions included the post-event stage.

Implications for research

To improve the evidence base for interventions to prevent and minimise aggression towards healthcare workers, we need more RCTs, with a published protocol.

Rather than a sole focus on the vector, studies should include the victim, the workers, as participants, to allow for evidence of the impact of violence on the worker.

Studies are needed for the non-mental health-related settings, especially for the emergency care setting. This will allow for studies with not only elderly people with mental health issues (next to physical health issues) as vectors, as violence against healthcare workers is not restricted to this group.

The settings need to be expanded to less controlled work settings, such as ambulances, and not only involve institutionalised care, as emergency care workers have a known high exposure to violence at work.

Categorisation of studies into violence needs to take settings and interventions into account, as this provides essential information on applicability and generalisability.

Interventions at all stages of violence are needed and should therefore also include post-event interventions. Post-event interventions can also contribute to prevention or reduction of violence in that they may: have a deterring effect on perpetrators; have a supporting effect on personnel; and contribute to a reduction in repeat incidents.

Outcome measures should be more homogenous, better standardised and allow for generalisation across populations. Outcome measures should focus on the victim and be measured in terms of (reduced) impact on the victim, such as number of incidents per 100 workers per year, absenteeism, turnover costs (for both worker and employer) and recovery time.

In conclusion, we recommend the following parameters for studies investigating the impact of interventions to prevent or minimise violence against healthcare workers.

1. Use a cluster-RCT design.
2. Include a large enough sample size of at least 285 participants per group, based on a control group mean incident rate of 6.38, as reported by Gillespie 2014 (SD 8.02), and an assumed rate reduction of 30%.
3. Cover more settings and vectors: e.g. psychiatric care and aged care, emergency care personnel in hospital and outside of hospital, in- and outpatient settings, and rural and remote working healthcare workers, in order to better cover the complete domain of healthcare workers that are exposed to violence.
4. Interventions should focus on preventing violence or reducing the impact of violence on the victim.
5. Outcomes should be measured in terms of the impact on the victim/the worker by looking at frequency and intensity of incidents and by assessing the follow-up and long-term outcomes for the worker.

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CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Bowers 2015

Study characteristics	
Methods	Cluster-RCT
Participants	Staff and patients in 31 randomly chosen acute psychiatric wards at 15 randomly chosen hospitals. Sixteen wards formed the intervention group, 15 wards the control group.
Interventions	This intervention focused on the vector, the victim, and the environment and included two phases: pre-event, event.

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Bowers 2015 *(Continued)*

	The intervention was the implementation of the complex Safewards intervention. The intervention is targeted at nursing staff and consists of ten interventions: (1) mutually agreed and publicised standards of behaviour for staff and patients, (2) short advisory statements ('soft words'), (3) de-escalation model used by the best de-escalator to expand overall skills, (4) saying something good about each patient at handover, (5) scanning for bad news for the patient from significant others and intervening promptly, (6) 'know each other' folder in patient day room for structured, shared, innocuous personal information between patients and staff, (7) regular patient meeting to bolster inter-patient support, (8) a crate of distraction and sensory modulation tools, (9) patient reassurance following potentially frightening incidents (10) display on the ward of positive messages from discharged patients. Wards in the control condition implemented a package of health promotion interventions directed at improving staff physical health.
Outcomes	Patient-staff Conflict Checklist (PCC) total rates of conflicts, mean and SD.
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "Three random selections were made (i) hospitals, (ii) two wards at each hospital, (iii) allocation to experimental or control."
Allocation concealment (selection bias)	Unclear risk	Quote: "All randomisation was done independently of the researchers and the trial statistician."
Blinding of participants and personnel (performance bias) All outcomes	High risk	Quote: "Finally the gain on the control wards may have been a result of contamination from the experimental ward on the same location. Staff on the different wards were asked not to talk with each other about the interventions they were using, however there were unit managers who crossed over both wards, and the small size of many psychiatric units meant that staff often substituted for each other across wards (...)." In the discussion, the authors comment on possible contamination in discussion due to small wards, manager cross-over and substitution.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	The outcome assessors are the participants.
Incomplete outcome data (attrition bias) All outcomes	High risk	Quote: "Undesirable high level of missing data". Large quantity of missing data. The authors did make several attempts to determine that impact this may have on the treatment effect and found it to be low.
Selective reporting (reporting bias)	Low risk	The authors have conducted this study several times and appear to be reporting the same or very similar outcome data.
Other bias	Low risk	No other biases detected.

Burack 2012

Study characteristics

Methods	CBA

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Burack 2012 *(Continued)*

Participants	The participants were 101 elders in a nursing home in a large urban area in the USA, 51 in the intervention condition, 50 as the control group. The groups were significantly different on race and Activities of Daily Living (ADL), the intervention group had a significantly higher percentage of white participants (70%) and were less ADL dependent.
Interventions	The intervention, a culture change, focused on the vector, the pre-event phase and the event phase. The culture change intervention consisted of a transformation of nursing home care from a traditional hospital-model of care to a person-centred care model. Elements of the culture change were: (1) the creation of community coordinator positions, (2) Education about the culture change model, (3) a flattening of the organisational and community structures, (4) meaningful activities and resident choice, (5) family involvement, (6) increased consistent staffing, and (7) environmental changes, for example more personalised rooms and redecorating of communal rooms to create a more homely and calm environment. The control communities, continued to function along the nursing home's pre-cultural change model.
Outcomes	Physical and verbal agitation, two of the three subscales from the Cohen Mansfield Agitation Inventory (CMAI). An assessor is asked to rate, on a 7-point scale, the frequency with which the elder has manifested a certain behaviour during the past two weeks. Mean and SD.
Notes	Longitudinal study: 2 year follow-up. The third subscale (forceful behaviour) was excluded as this is described as non-aggressive.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	CBA, no randomisation. Based on description in "Methods" staff chose intervention communities with well functioning teams. Comparison communities were selected by staff to best match culture change group.
Allocation concealment (selection bias)	High risk	CBA, no concealment
Blinding of participants and personnel (performance bias) All outcomes	High risk	Unlikely that personnel (nursing attendants who were interviewed to provide answers to questions on Cohan Mansfield Agitation Inventory) were blinded. Unclear if participants (patients) were blinded - 59% suffering from dementia and thus cognition would be uncertain.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	High risk	49% (n = 100) were not available for data collection at time 2 (67 died, 20 were discharged. transferred, 2 were unable to provide consent, 11 nursing attendant interviews could not be obtained)
Selective reporting (reporting bias)	Low risk	The authors report on several outcomes measures.
Other bias	Low risk	No other biases detected.

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Clark 1998

Study characteristics	
Methods	Cross-over RCT
Participants	The participants were 10 older adults (mean age 82, SD 10, range 55-95, 14 women, 4 men), with severe levels of cognitive impairment in a nursing home in the South of the USA.
Interventions	The intervention focused at the vector and the event phase. Recorded preferred music was offered to patients with Alzheimer's during bathing episodes. Patients were randomly allocated to either a bathing episode with or without music. Following a 2-week observation period (10 episodes), conditions were reversed. The control condition was care as usual.
Outcomes	Combined measure of the five most frequently observed aggressive behaviours (yelling, abusive language, hitting, verbal resistance, physical resistance). Mean and SD.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Participants were "randomly allocated" to two groups. No further information provided.
Allocation concealment (selection bias)	High risk	Concealment not attempted
Blinding of participants and personnel (performance bias) All outcomes	High risk	Blinding not attempted
Blinding of outcome assessment (detection bias) All outcomes	High risk	Blinding not attempted
Incomplete outcome data (attrition bias) All outcomes	Low risk	Low levels of incomplete data
Selective reporting (reporting bias)	Low risk	Interobserver agreement between trained observers was high
Other bias	High risk	No mention is made of a washout period.

Gillespie 2014

Study characteristics	
Methods	CBA
Participants	The study involved 209 staff members of 6 emergency departments (3 intervention, 3 control): 2 level 1 trauma centres, 2 urban tertiary emergency departments, and 2 community-based suburban emergency departments in the USA. Participants were primarily female (71%), nurses (56%) and working in

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Gillespie 2014 *(Continued)*

	a level 1 trauma centre (62%). Mean age was 37.3 years (SD 10.5, range 20-65). Most participants (86%) had been threatened or assaulted at least once during the 18 months data collection.
Interventions	The intervention focused on the vector, the victim, and the environment and included two phases: pre-event, event. The authors partnered with employees, managers, and hospital administration to develop their Work Place Violence (WPV) intervention, which consisted of three components: environmental changes, policies and procedures, and education and training. Implementation of all components took place over a three month period. The control condition was practice as usual.
Outcomes	Violent event rates over a period of 18 months, total number events: mean and SD
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	CBA, no randomisation
Allocation concealment (selection bias)	High risk	CBA, no concealment
Blinding of participants and personnel (performance bias) All outcomes	High risk	Quote: "The employees and managers at these 3 sites frequently alluded to the fact that they were becoming more aware of and concerned about increasing WPV." It seems clear that both the controls and the subjects were influenced by the program in ways that were beyond the scope of the intervention.
Blinding of outcome assessment (detection bias) All outcomes	High risk	No blinding of outcome assessment
Incomplete outcome data (attrition bias) All outcomes	Low risk	The outcome data seem complete
Selective reporting (reporting bias)	Low risk	Data were clearly reported
Other bias	Low risk	No other biases detected

Low 2014

Study characteristics

Methods	Cluster-RCT
Participants	The participants were residents in 35 nursing homes in and near Sydney, Australia. The intervention condition included 189 participants in 17 facilities and the control condition included 209 participants in 18 facilities. There were no significant differences on demographic characteristics between the groups.

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Low 2014 *(Continued)*

Interventions	The intervention focused on the vector and the pre-event phase. Low et al introduced humour therapy by professional 'Elder Clowns', augmented by resident engagement by trained staff 'Laughter Bosses'. The intervention consisted of one day Laughter Boss training for nominated staff members on the evidence linking humour and health and practical ways for introduction humour in daily care. In addition, an Elder Clown, a trained performer with experience in healthcare settings, conducted between 9-12 humour therapy sessions with available and willing residents. Elder Clowns tailored their interactions to maximise resident engagement. Controls received usual care.
Outcomes	Agitation as measured by the Cohen Mansfield Agitation Inventory, no information on number of items or subscales. Adjusted mean difference (95% CI) between baseline and follow-up.
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	A random number generator in Excel was used to assign homes to intervention and control groups.
Allocation concealment (selection bias)	High risk	No allocation concealment was described.
Blinding of participants and personnel (performance bias) All outcomes	High risk	No concealment to staff and only partial concealment to data collection staff. Blinding was revealed for 15 separate homes to one or two data collection staff, other three data collections staff remained blinded.
Blinding of outcome assessment (detection bias) All outcomes	High risk	Data collection staff became ‘unblinded’ over time for 15 of the 35 homes.
Incomplete outcome data (attrition bias) All outcomes	Low risk	Authors state relatively high follow-up rates. They reported a drop from 398 at baseline to 343 at follow-up.
Selective reporting (reporting bias)	Low risk	Outcome data were consistent with protocol
Other bias	Low risk	No other biases detected

Sloane 2004

Study characteristics

Methods	Cross-over RCT
Participants	The participants were residents of 15 nursing homes in the USA, nine in Oregon, 6 in North Carolina. Five nursing homes were in the control group, 10 in the intervention group. For several reasons (drop out during the study, consent) only 23 nursing home residents were included in the control group and 46 in the intervention group. The only difference between the groups was that the control residents were more often female, slightly less cognitively impaired and more often visually impaired. In addition, the study included 13 nursing assistants in the control group and 24 in the intervention group. Both groups were similar in age, gender and length of employment.

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Sloane 2004 *(Continued)*

Interventions	The intervention focused on the vector and the event-phase. The two non-pharmacological interventions involved person-centred bathing for nursing home residents with dementia. The first intervention is a towel bath, an in-bed bath method in which the caregiver uses two bath blankets, two bath towels, a no-rinse soap, and two-quarters of warm water; keeps the resident covered at all times; and cleanses the body using gentle massage. The second intervention, person-centred showering, sought to individualise the experience for the resident by using a wide variety of techniques, such a providing choices, maintaining resident warmth, and distracting attention. There was cross-over between the experimental groups and the control group received care as usual.
Outcomes	Overall agitation and aggression ratings during the intervention between the control group and the two intervention conditions. The ratings are done on a CAREBA (Care Recipient Behaviour Assessment) scale which is an adjustment of the Cohen-Mansfield Agitation Inventory (CMAI). Mean and SD.
Notes	There appears to be no ethics clearance for this study, where nursing home residents being bathed are video recorded.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	There was no report of random sequence generation.
Allocation concealment (selection bias)	High risk	There was no allocation concealment.
Blinding of participants and personnel (performance bias) All outcomes	High risk	There was no blinding of participants or nursing home personnel.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Quote: "Videotapes were presented to raters in random order, and the raters were blinded to the study aims, the assignment of subjects, and the pre- or post-intervention status of the tapes they rated."
Incomplete outcome data (attrition bias) All outcomes	Low risk	Data appear to be complete
Selective reporting (reporting bias)	Low risk	Outcome reporting appears to be complete and in line with protocol
Other bias	High risk	No mention is made of a washout period.

van de Sande 2011

Study characteristics

Methods	Cluster RCT
Participants	The study involved 4 acute psychiatric wards in and near Rotterdam, the Netherlands. During the baseline period 170 patients were residents on the ward (80 in the intervention, 90 in the control group), during the intervention period there were 207 patients in the intervention group and 251 in the control group. In the baseline period there was no difference between the groups for age and gender, however patients in the experimental condition were more often from an ethnic minority background, more of-

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van de Sande 2011 *(Continued)*

	ten involuntarily admitted, and more likely to be diagnosed with a psychotic or a personality disorder. During the intervention period, this was the same with the exception of the difference in ethnic background: the numbers of patients from ethnic minorities were similar.
Interventions	The intervention focused on the vector and the pre-event phase and consisted of a short-term risk assessment tool: the Crisis Monitor. Patients were monitored daily by (trained) psychiatric nurses on the experimental wards by means of risk assessment scales from admission to discharge or transfer. The results were discussed during inter- and multidisciplinary meetings. In addition, the Broset Violence Checklist, the Kennedy Axis V, the Brief Psychiatric Rating Scale (BPRS), the Dangerousness Scale, and the Social Dysfunction and Aggression Scale were used. These five complementary scales covered a broad variety of common risk factors in acute psychiatric wards. In the control condition, treatment as usual was provided: unstructured psychiatric observations and treatment based on clinical judgement, no risk assessment tools were used.
Outcomes	Aggression rates during the 30-week intervention period. RR (95% CI).
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Quote: "Four wards were divided into two experimental and two control ward clusters". They were randomly allocated to the control or experimental condition after a 10 week baseline period.
Allocation concealment (selection bias)	High risk	No allocation concealment was described.
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	There was no blinding of participants or personnel.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	The researchers seem to have implemented appropriate methods to ensure reliable outcome measures.
Incomplete outcome data (attrition bias) All outcomes	Low risk	The data appear to be complete.
Selective reporting (reporting bias)	Low risk	The outcome data appear to be in line with the protocol.
Other bias	Low risk	No other biases detected

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Abderhalden 2004	Wrong study design
Abraham 2001	Wrong intervention

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Study	Reason for exclusion
Abushakra 2012	Wrong intervention
Adams 2017	Wrong intervention
Adamson 2009	Wrong study design
Alexander 2004a	Wrong intervention
Alexander 2004b	Duplicate
Algwaiz 2012	Wrong study design
Alibeu 1990	Wrong study design
Allen 2011	Wrong intervention
Ananth 1972	Wrong intervention
Anderson 2006	Wrong intervention
Andrezina 2006	Wrong intervention
Anonymous 2007	Wrong intervention
Arbach Lucioni 2011	Wrong study design
Arnetz 2000	Wrong intervention
Arnetz 2016	Wrong intervention
Arnetz 2017	Wrong intervention
Asadollahi 2015	Wrong study design - chemical
Baker 2003	Wrong study design - chemical
Baldacara 2010	Wrong study design - chemical
Barbui 2008	Wrong study design - chemical
Battaglia 1997	Wrong study design - chemical
Beck 1997	Wrong study design - chemical
Beck 2002	Wrong patient population
Bergk 2011	Wrong intervention
Bieniek 1998	Wrong study design - chemical
Bowers 2006	Wrong study design
Bowers 2008	Wrong intervention
Burton 1995	Wrong study design - chemical

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Study	Reason for exclusion
Cailhol 2007	Wrong intervention
Calver 2010	Wrong study design - chemical
Calver 2015	Wrong study design - chemical
Carlowe 2011	Wrong study design
Chan 2006	Wrong study design - chemical
Chou 2016	Wrong study design
Chu 2013	Wrong study design
Citrome 2001	Wrong study design - chemical
Citrome 2007	Wrong study design - chemical
Crawford 2004	Wrong study design
Currier 2001	Wrong study design - chemical
Esmailian 2015	Wrong study design - chemical
FlanneryJr 1998	Wrong study design
Ford 2007	Wrong patient population
Geoffrion 2017	Wrong intervention
Gerdtz 2006	Wrong study design
Gormley 2001	Wrong intervention
Hick 2001	Wrong study design
Hill 2015	Wrong study design
Hoeffer 2006	Wrong intervention
Holliday Welsh 2009	Wrong study design
Huf 2002a	Wrong study design - chemical
Huf 2002b	Duplicate
Huf 2003	Wrong study design - chemical
Huf 2007	Wrong study design - chemical
Huf 2010	Wrong study design - chemical
Huf 2011	Wrong study design
Huf 2012	Wrong intervention

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Study	Reason for exclusion
Hurley 2008	Wrong study design - chemical
Ideker 2011	Wrong study design
Isbister 2010a	Duplicate
Isbister 2010b	Wrong study design - chemical
Istikoglou 2010	Wrong study design - chemical
Jayaram 2012	Wrong study design
Kasinathan 2015	Wrong study design
Kim 2012	Wrong study design
Lenox 1992	Wrong study design - chemical
McAllister Williams 2005	Wrong intervention
Meehan 2006	Wrong study design
Nau 2010	Wrong intervention
Nobay 2004	Wrong study design - chemical
Phillips 2008	Wrong intervention
Pratts 2014	Wrong study design - chemical
Raveendran 2007a	Duplicate
Raveendran 2007b	Duplicate
Riddell 2017	Wrong study design
Risor 2017	Wrong intervention
Rogers 2012	Wrong study design
Rosen 1997	Wrong study design - chemical
Simopoulos 1971	Wrong study design - chemical
Sival 2004	Wrong study design - chemical
Sivarajasingam 2003	Wrong setting
Smith 1974	Wrong study design - chemical
Smith 2003	Wrong study design - chemical
Tariot 1998	Wrong study design - chemical
Tharyan 2008	Wrong study design - chemical

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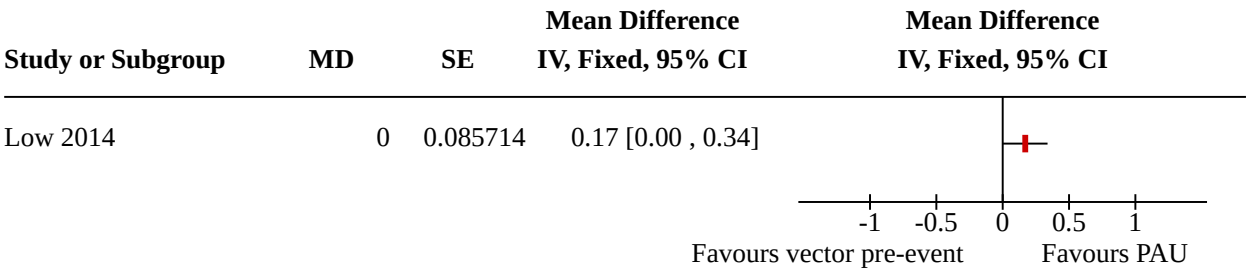
Study	Reason for exclusion
Thomas 1992	Wrong study design - chemical
Touzet 2014	Wrong study design
TREC Collaborative Group 2003	Wrong study design - chemical
Tyrer 2009	Wrong study design - chemical
Veser 2002	Wrong study design - chemical
Villari 2008	Wrong study design - chemical
Waraich 2004	Wrong study design - chemical
Wingenfeld 2011	Wrong intervention
Yoon 2017	Wrong study design - chemical

DATA AND ANALYSES

Comparison 1. Vector-directed at pre-event versus practice as usual

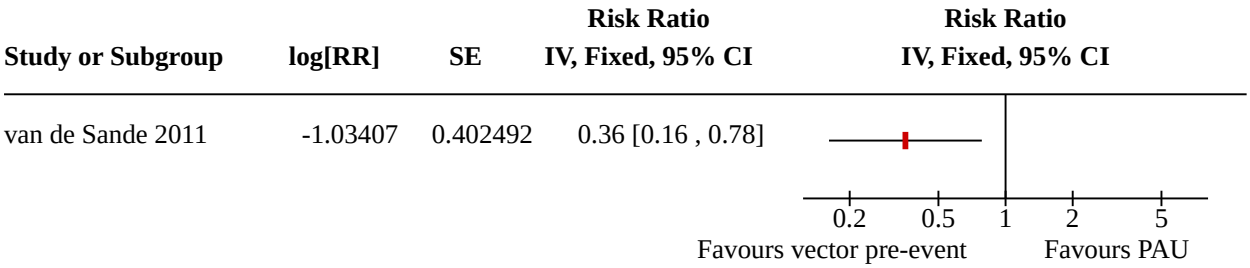
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1.1 Incident scale (medium term)	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
1.2 Incident count (medium term)	1		Risk Ratio (IV, Fixed, 95% CI)	Totals not selected

Analysis 1.1. Comparison 1: Vector-directed at pre-event versus practice as usual, Outcome 1: Incident scale (medium term)



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Analysis 1.2. Comparison 1: Vector-directed at pre-event versus practice as usual, Outcome 2: Incident count (medium term)

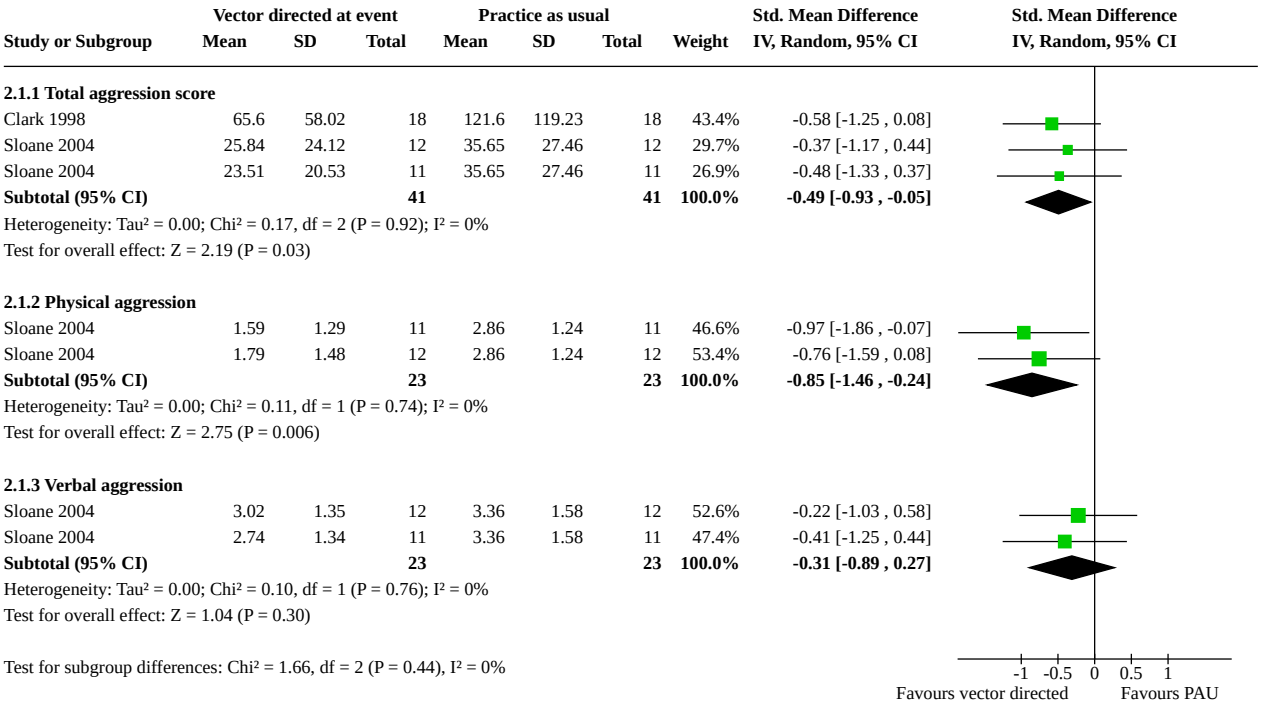


Comparison 2. Vector-directed at event versus practice as usual

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
2.1 Incident scale (short term)	2		Std. Mean Difference (IV, Random, 95% CI)	Subtotals only
2.1.1 Total aggression score	2	82	Std. Mean Difference (IV, Random, 95% CI)	-0.49 [-0.93, -0.05]
2.1.2 Physical aggression	1	46	Std. Mean Difference (IV, Random, 95% CI)	-0.85 [-1.46, -0.24]
2.1.3 Verbal aggression	1	46	Std. Mean Difference (IV, Random, 95% CI)	-0.31 [-0.89, 0.27]

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Analysis 2.1. Comparison 2: Vector-directed at event versus practice as usual, Outcome 1: Incident scale (short term)

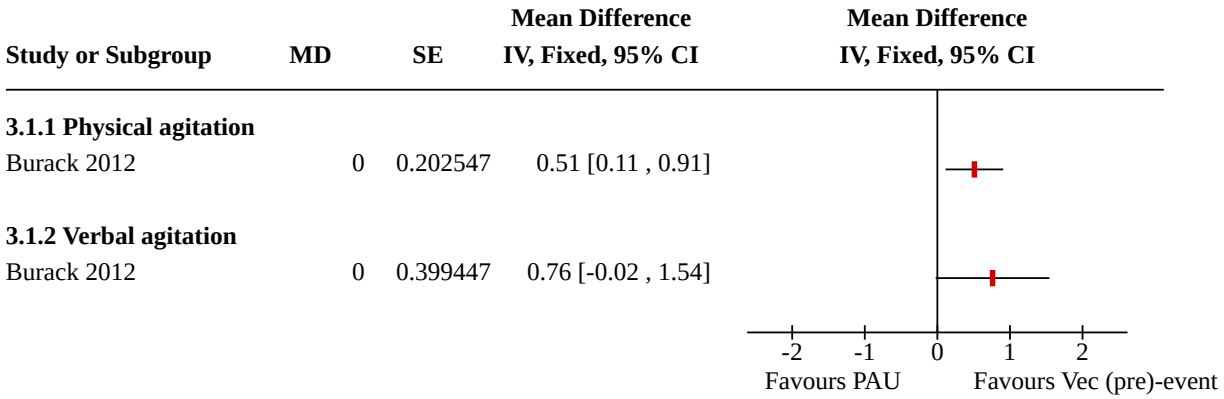


Comparison 3. Vector-directed at pre-event/event versus practice as usual

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
3.1 Incident scale (long term)	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
3.1.1 Physical agitation	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
3.1.2 Verbal agitation	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected

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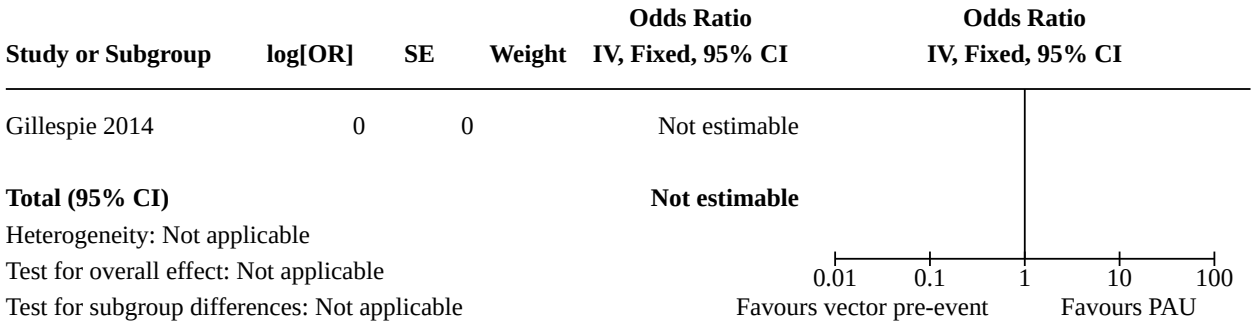
Analysis 3.1. Comparison 3: Vector-directed at pre-event/event versus practice as usual, Outcome 1: Incident scale (long term)



Comparison 4. Multicomponent versus practice as usual

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
4.1 Incident count (medium term)	1		Odds Ratio (IV, Fixed, 95% CI)	Not estimable

Analysis 4.1. Comparison 4: Multicomponent versus practice as usual, Outcome 1: Incident count (medium term)

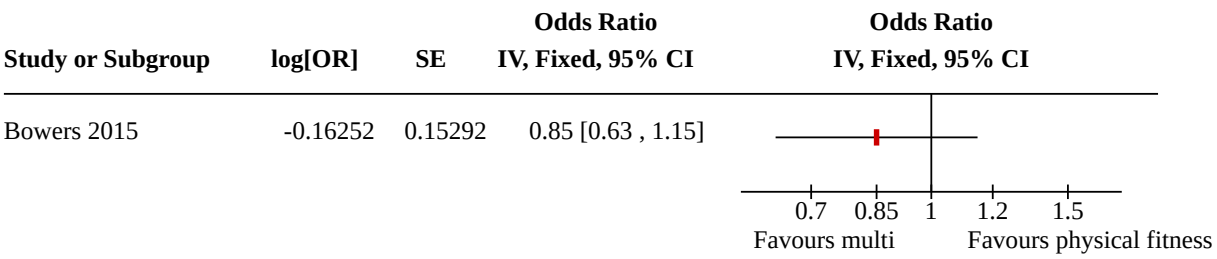


Comparison 5. Multicomponent versus physical fitness

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
5.1 Incident count (short term)	1		Odds Ratio (IV, Fixed, 95% CI)	Totals not selected

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Analysis 5.1. Comparison 5: Multicomponent versus physical fitness, Outcome 1: Incident count (short term)



ADDITIONAL TABLES

Table 1. Included studies summarised in the Haddon Matrix

Phase	Victim/healthcare worker	Vector/patient or their advocate	Social environment
Pre-event	Bowers 2015 Gillespie 2014	Bowers 2015 Burack 2012 Gillespie 2014 Low 2014 van de Sande 2011	Bowers 2015 Gillespie 2014
Event	Bowers 2015 Gillespie 2014	Bowers 2015 Burack 2012 Clark 1998 Gillespie 2014 Sloane 2004	Bowers 2015 Gillespie 2014
Post-event	No studies	No studies	No studies

APPENDICES

Appendix 1. MEDLINE search strategy

Abbreviations used in this document

mp	mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier

Database: Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations and Ovid MEDLINE(R) <1996 to May 25 2019>
Search Strategy: (results in brackets)

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Search no.	Keyword
1	Workplace Violence/
2	Violence/pc
3	violen*.mp.
4	aggress*.mp.
5	angry.mp.
6	hostil*.mp.
7	"inappropriate behavio?r".mp.
8	bullying.mp.
9	pester*.mp.
10	Bullying/
11	Aggression/
12	Hostility/
13	inappropriate behavio?r.mp.
14	(mob or mobs or mobbing).mp.
15	Agonistic Behavior/
16	harass*.mp.
17	disrupt*.mp.
18	incivility.mp.
19	abus*.mp.
20	assault*.mp.
21	Violence/
22	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21
23	Health Occupations/ or Allied Health Occupations/
24	health personnel.mp. or Health Personnel/
25	personnel, hospital.mp. or Personnel, Hospital/
26	health care worker.mp.

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(Continued)

27	health care workers.mp.
28	health care personnel.mp.
29	health-personnel.mp.
30	health provider.mp.
31	health providers.mp.
32	health care provider.mp.
33	health care providers.mp.
34	health staff.mp.
35	health care staff.mp.
36	healthcare staff.mp.
37	health professional.mp.
38	health care professional.mp.
39	healthcare professional.mp.
40	health worker.mp.
41	medical staff.mp.
42	medical personnel.mp.
43	medical professional.mp.
44	medical worker.mp.
45	medical provider.mp.
46	military-medical personnel.mp.
47	Physicians/ or physicians.mp.
48	Physician.mp.
49	doctor.mp.
50	practitioner.mp.
51	clinician.mp.
52	nurses.mp. or Nurses/
53	nurse.mp.
54	nursing staff.mp.

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(Continued)

55	nursing assistant.mp.
56	nursing assistants.mp.
57	Nurses' Aides/
58	Nurse Midwives/
59	midwife.mp.
60	midwives.mp.
61	Dentists/ or dental personnel.mp. or Dental Staff/
62	dentist.mp.
63	dentists.mp.
64	dental assistant.mp.
65	dental assistants.mp. or Dental Assistants/
66	Pharmacists' Aides/ or Pharmacists/
67	pharmacist.mp.
68	physical therapists.mp. or Physical Therapists/
69	physical therapist.mp.
70	physiotherapist*.mp.
71	therapist*.mp.
72	Physical Therapist Assistants/
73	technician*.mp.
74	radiographer.mp.
75	radiographers.mp.
76	emergency medical services.mp. or Emergency Medical Services/
77	Patient Transfer/ or "Transportation of Patients"/ or transporting patients.mp.
78	patient transport.mp.
79	Allied Health Personnel/
80	paramedic*.mp.
81	paramedical personnel.mp.
82	emergency department.mp. or Emergency Service, Hospital/

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(Continued)

83	emergenc*.mp.
84	health manager.mp.
85	health care manager.mp.
86	healthcare manager.mp.
87	clinical officer.mp.
88	reception.mp.
89	23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 or 60 or 61 or 62 or 63 or 64 or 65 or 66 or 67 or 68 or 69 or 70 or 71 or 72 or 73 or 74 or 75 or 76 or 77 or 78 or 79 or 80 or 81 or 82 or 83 or 84 or 85 or 86 or 87 or 88
90	22 and 89
91	Organizational Policy/
92	Policy/
93	organi?ational polic*.mp.
94	policy.mp.
95	interven*.mp.
96	policies.mp.
97	management.mp.
98	Safety Management.mp. or Safety Management/
99	Staff Development.mp. or Staff Development/
100	Inservice Training.mp. or Inservice Training/
101	professional development.mp.
102	program*.mp.
103	aggression management.mp.
104	reduction.mp.
105	evaluation.mp.
106	decreas*.mp.
107	(prevention and control).mp.
108	measures.mp.
109	improv*.mp.

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(Continued)

110	91 or 92 or 93 or 94 or 95 or 96 or 97 or 98 or 99 or 100 or 101 or 102 or 103 or 104 or 105 or 106 or 107 or 108 or 109
111	90 and 110
112	Randomized Controlled Trials as Topic/
113	randomi?ed controlled trial.mp.
114	randomi?ed.mp.
115	placebo.mp.
116	controlled clinical trial.mp. or Controlled Clinical Trial/
117	Clinical Trials as Topic/
118	randomly.mp.
119	trial.mp.
120	Random Allocation/
121	randomi?ation.mp.
122	Randomized Controlled Trial/
123	112 or 113 or 114 or 115 or 116 or 117 or 118 or 119 or 120 or 121 or 122
124	111 and 123
125	controlled before-after study.mp. or Controlled Before-After Studies/
126	controlled before-after stud*.mp.
127	"controlled before and after stud*".mp.
128	CBA stud*.mp.
129	before-after study.mp.
130	before-after studies.mp.
131	125 or 126 or 127 or 128 or 129 or 130
132	111 and 131
133	prospective studies.mp. or Prospective Studies/
134	prospective study.mp.
135	longitudinal studies.mp. or Longitudinal Studies/
136	133 or 134 or 135
137	111 and 136

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Appendix 2. Data extraction form

Cochrane Work Group

Cochrane Work title 029: Organisational interventions for preventing and minimising aggression directed towards healthcare workers

Data collection form for intervention reviews: RCTs, cluster-RCTs and CBAs

Review title or ID
Study ID
Report ID
Report ID of other reports of this study including errata or retractions
Notes

General information

Date form completed
Name/ID of person extracting data
Reference citation
Study author contact details
Publication type
Notes:

Study eligibility

Study characteristics	Eligibility criteria	Eligibility criteria met?			Location in text or source
		Yes	No	Unclear	
Type of study	Randomised controlled trial				
	Controlled before-and-after study				
Participants					
Types of intervention					
Types of comparison					

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(Continued)

Types of outcome measures	
INCLUDE	EXCLUDE
Reason for exclusion	
Notes:	

DO NOT PROCEED IF STUDY IS EXCLUDED FROM REVIEW

Characteristics of included studies

Methods

	Descriptions as stated in report/paper	Location in text or source
Aim of study		
Design		
Unit of allocation		
Start date		
End date		
Duration of participation		
Ethical approval needed/obtained for study	Yes No Unclear	
Notes:		

Participants

	Description	Location in text or source
Population description		
Setting		
Inclusion criteria		
Exclusion criteria		
Method of recruitment of participants		
Informed consent obtained	Yes No Unclear	

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(Continued)

Total no. randomised
Clusters
Baseline imbalances
Withdrawals and exclusions
Age
Sex
Race/ethnicity
Severity of illness
Comorbidities
Other relevant sociodemographics
Subgroups measured
Subgroups reported
Notes:

Intervention groups

Intervention group 1

	Description as stated in report/paper	Location in text or source
Group name		
No. randomised to group		
Theoretical basis		
Description		
Duration of treatment period		
Timing		
Delivery		
Providers		
Co-interventions		
Economic information		

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(Continued)

Resource requirements
Integrity of delivery
Compliance
Notes:

Outcomes (separate for each outcome)

1. Number of episodes of aggression
2. Number of episodes of aggression resulting in no harm or injury, psychological harm or injury, or physical harm or injury

	Description as stated in report/paper	**Location in text or source**
Outcome name		
Time points measured		
Time points reported		
Outcome definition		
Person measuring/reporting		
Unit of measurement		
Scales: upper and lower limits		
Is outcome/tool validated?	Yes No Unclear	
Imputation of missing data		
Assumed risk estimate		
Power		
Notes:		

Other

Study funding sources
Possible conflicts of interest
Notes:

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'Risk of bias' assessment

Domain	Risk of bias			Support for judgement *(include direct quotes where available with explanatory comments)*	Location in text or source
	Low	High	Unclear		
Random sequence generation *(selection bias)*					
Allocation concealment *(selection bias)*					
Blinding of participants and personnel *(performance bias)*				Outcome group: All/	
(if separate judgement by outcome(s) required)				Outcome group:	
Blinding of outcome assessment *(detection bias)*				Outcome group: All/	
(if separate judgement by outcome(s) required)				Outcome group:	
Incomplete outcome data *(attrition bias)*				Outcome group: All/	
(if separate judgement by outcome(s) required)				Outcome group:	
Selective outcome reporting? *(reporting bias)*					
Other bias					
Notes:					

Data and analysis (for each outcome)

Dichotomous outcome

	Description as stated in report/paper	Location in text or source
Comparison		
Outcome		
Subgroup		

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(Continued)

Time point				
Results	Intervention		Comparison	
	No. with event	Total in group	No. with event	Total in group
Any other results reported				
No. missing participants				
Reasons missing				
No. participants moved from other group				
Reasons moved				
Unit of analysis				
Statistical methods used and appropriateness of these				
Reanalysis required?	Yes No Unclear			
Reanalysis possible?	Yes No Unclear			
Reanalysed results				
Notes:				

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Continuous outcome

	Description as stated in report/paper						Location in text or source
Comparison							
Outcome							
Subgroup							
Time point							
Post-intervention or change from baseline?							
Results	Intervention			Comparison			
	Mean	SD	No. participants	Mean	SD	No. participants	
Any other results reported							
No. missing participants							
Reasons missing							
No. participants moved from other group							
Reasons moved							
Unit of analysis							
Statistical methods used and appropriateness of these							
Reanalysis required?	Yes No Unclear						
Reanalysis possible?	Yes No Unclear						
Reanalysed results							
Notes:							

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Other outcome

	Description as stated in report/paper				Location in text or source
Comparison					
Outcome					
Subgroup					
Time point					
No. participant	Intervention		Control		
Results	Intervention result	SE (or other variance)	Control result	SE (or other variance)	
	Overall results		SE (or other variance)		
Any other results reported					
No. missing participants					
Reasons missing					
No. participants moved from other group					
Reasons moved					
Unit of analysis					
Statistical methods used and appropriateness of these					
Reanalysis required?)	Yes No Unclear				
Reanalysis possible?	Yes No Unclear				
Reanalysed results					
Notes:					

Other information

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	Description as stated in report/paper	Location in text or source
Key conclusions of study authors		
References to other relevant studies		
Correspondence required for further study information		
Notes:		

Appendix 3. EMBASE search strategy

Database(s): Embase Classic+Embase

Search no. Keyword

1 workplace violence/

2 violence/

3 violen*.mp.

4 aggress*.mp.

5 angry.mp.

6 hostil*.mp.

7 (inappropriate behavior or inappropriate behaviour).mp.

8 bullying.mp.

9 pester*.mp.

10 Bullying/

11 Aggression/

12 Hostility/

13 inappropriate behavio?r.mp.

14 (mob or mobs or mobbing).mp.

15 Agonistic Behavior/

16 harass*.mp.

17 disrupt*.mp.

18 incivility.mp.

19 abus*.mp.

20 assault*.mp.

21 Violence/

22 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21

23 Health Occupations/ or Allied Health Occupations/

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24 health personnel.mp. or Health Personnel/

25 personnel, hospital.mp. or Personnel, Hospital/

26 health care worker.mp.

27 health care workers.mp.

28 health care personnel.mp.

29 health-personnel.mp.

30 health provider.mp.

31 health providers.mp.

32 health care provider.mp.

33 health care providers.mp.

34 health staff.mp.

35 health care staff.mp.

36 healthcare staff.mp.

37 health professional.mp.

38 health care professional.mp.

39 healthcare professional.mp.

40 health worker.mp.

41 medical staff.mp.

42 medical personnel.mp.

43 medical professional.mp.

44 medical worker.mp.

45 medical provider.mp.

46 military-medical personnel.mp.

47 Physicians/ or physicians.mp.

48 Physician.mp.

49 doctor.mp.

50 practitioner.mp.

51 clinician.mp.

52 nurses.mp. or Nurses/

53 nurse.mp.

54 nursing staff.mp.

55 nursing assistant.mp.

56 nursing assistants.mp.

57 Nurses Aides/

58 Nurse Midwives/

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59 midwife.mp.

60 midwives.mp.

61 Dentists/ or dental personnel.mp. or Dental Staff/

62 dentist.mp.

63 dentists.mp.

64 dental assistant.mp.

65 dental assistants.mp. or Dental Assistants/

66 Pharmacists Aides/ or Pharmacists/

67 pharmacist.mp.

68 physical therapists.mp. or Physical Therapists/

69 physical therapist.mp.

70 physiotherapist*.mp.

71 therapist*.mp.

72 Physical Therapist Assistants/

73 technician*.mp.

74 radiographer.mp.

75 radiographers.mp.

76 emergency medical services.mp. or Emergency Medical Services/

77 Patient Transfer/ or Transportation of Patients.mp.

78 patient transport.mp.

79 Allied Health Personnel/

80 paramedic*.mp.

81 paramedical personnel.mp.

82 emergency department.mp. or Emergency Service, Hospital/

83 emergenc*.mp.

84 health manager.mp.

85 health care manager.mp.

86 healthcare manager.mp.

87 clinical officer.mp.

88 reception.mp.

89 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 or 60 or 61 or 62 or 63 or 64 or 65 or 66 or 67 or 68 or 69 or 70 or 71 or 72 or 73 or 74 or 75 or 76 or 77 or 78 or 79 or 80 or 81 or 82 or 83 or 84 or 85 or 86 or 87 or 88

90 22 and 89

91 Organizational Policy/

92 Policy/

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93 organi?ational polic*.mp.

94 policy.mp.

95 interven*.mp.

96 policies.mp.

97 management.mp.

98 Safety Management.mp. or Safety Management/

99 Staff Development.mp. or Staff Development/

100 Inservice Training.mp. or Inservice Training/

101 professional development.mp.

102 program*.mp.

103 aggression management.mp.

104 reduction.mp.

105 evaluation.mp. 2021448
106 decreas*.mp.

107 (prevention and control).mp.

108 measures.mp.

109 improv*.mp.

110 91 or 92 or 93 or 94 or 95 or 96 or 97 or 98 or 99 or 100 or 101 or 102 or 103 or 104 or 105 or 106 or 107 or 108 or 109

111 90 and 110

112 Randomized Controlled Trials as Topic/

113 randomi?ed controlled trial.mp.

114 randomi?ed.mp.

115 placebo.mp.

116 controlled clinical trial.mp. or Controlled Clinical Trial/

117 Clinical Trials as Topic/

118 randomly.mp.

119 trial.mp.

120 Random Allocation/

121 randomi?ation.mp.

122 Randomized Controlled Trial/

123 112 or 113 or 114 or 115 or 116 or 117 or 118 or 119 or 120 or 121 or 122

124 111 and 123

125 controlled before-after study.mp. or Controlled Before-After Studies/

126 controlled before-after stud*.mp.

127 (controlled before and after stud*).mp.

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128 CBA stud*.mp.

129 before-after study.mp.

130 before-after studies.mp.

131 125 or 126 or 127 or 128 or 129 or 130

132 111 and 131

133 prospective studies.mp. or Prospective Studies/

134 prospective study.mp.

135 longitudinal studies.mp. or Longitudinal Studies/

136 133 or 134 or 135

137 111 and 136

138 124 or 132 or 137

Appendix 4. PSYCHINFO search strategy

Database(s): PsycINFO

Search Strategy:
Searches Results
1 exp Workplace Violence/
2 exp VIOLENCE/
3 violen*.mp.
4 aggress*.mp.
5 angry.mp.
6 hostil*.mp.
7 inappropriate behavio#r.mp.
8 pester*.mp.
9 exp BULLYING/
10 exp Aggressive Behavior/
11 exp HOSTILITY/
12 inappropriate behavio#r.mp.
13 (mob or mobs or mobbing).mp.
14 Agonistic Behavior.mp.
15 harass*.mp.
16 disrupt*.mp.
17 incivility.mp.
18 abus*.mp.
19 assault*.mp.
20 exp VIOLENCE/
21 bullying.mp.
22 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21
23 (Health Occupations or Allied Health Occupations).mp.
24 Health Personnel.mp. or exp Health Personnel/
25 Personnel, Hospital.mp.
26 health care worker.mp.
27 health care workers.mp.
28 health care personnel.mp.
29 health-personnel.mp.
30 health provider.mp.
31 health providers.mp.
32 health care provider.mp.
33 health care providers.mp.
34 health staff.mp.
35 health care staff.mp.
36 healthcare staff.mp.
37 health professional.mp

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38 health care professional.mp.
39 healthcare professional.mp.
40 health worker.mp.
41 medical staff.mp.
42 medical personnel.mp.
43 medical professional.mp.
44 medical worker.mp.
45 medical provider.mp.
46 military-medical personnel.mp.
47 exp PHYSICIANS/ or Physicians.mp.
48 Physician.mp.
49 doctor.mp.
50 practitioner.mp.
51 clinician.mp.
52 nurses.mp. or exp NURSES/
53 nurse.mp.
54 nursing staff.mp.
55 nursing assistant.mp.
56 nursing assistants.mp.
57 Nurses Aides.mp.
58 Nurse Midwives.mp.

59 midwife.mp.
60 midwives.mp.
61 exp Dentists/ or dental personnel.mp.
62 dentist.mp.
63 dentists.mp.
64 dental assistant.mp.
65 dental assistants.mp.
66 Pharmacists Aides.mp.
67 exp PHARMACISTS/ or pharmacist.mp.
68 exp Physical Therapists/ or physical therapists.mp.
69 physical therapist.mp.
70 physiotherapist*.mp.
71 therapist*.mp.
72 Physical Therapist Assistants.mp.
73 technician*.mp.
74 radiographer.mp.
75 radiographers.mp.
76 emergency medical services.mp.
77 transporting patients.mp.
78 patient transport.mp.
79 exp Allied Health Personnel/
80 paramedic*.mp.
81 paramedical personnel.mp.
82 exp Emergency Services/ or emergency department.mp.
83 emergenc*.mp.
84 health manager.mp.
85 health care manager.mp.
86 healthcare manager.mp.
87 clinical officer.mp.
88 reception.mp.
89 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 or 60 or 61 or 62 or 63 or 64 or 65 or 66 or 67 or 68 or 69 or 70 or 71 or 72 or 73 or 74 or 75 or 76 or 77 or 78 or 79 or 80 or 81 or 82 or 83 or 84 or 85 or 86 or 87 or 88
90 22 and 89
91 Organizational Policy.mp.
92 Policy.mp.
93 organi#ational polic*.mp.
94 policy.mp.
95 interven*.mp.
96 policies.mp.

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97 management.mp.
98 Safety Management.mp.
99 Staff Development.mp.
100 Inservice Training.mp. or exp Inservice Training/
101 professional development.mp.
102 program*.mp.
103 aggression management.mp.
104 reduction.mp.
105 evaluation.mp.
106 decreas*.mp.
107 (prevention and control).mp.
108 measures.mp.
109 improv*.mp.
110 91 or 92 or 93 or 94 or 95 or 96 or 97 or 98 or 99 or 100 or 101 or 102 or 103 or 104 or 105 or 106 or 107 or 108 or 109
111 90 and 110
112 Randomized Controlled Trials as Topic.mp.
113 randomi?ed controlled trial.mp.
114 randomi?ed.mp.
115 controlled clinical trial.mp.
116 Clinical Trials as Topic.mp.
117 randomly.mp.
118 trial.mp.

119 Random Allocation.mp.
120 randomi?ation.mp.
121 Randomized Controlled Trial.mp.
122 placebo.mp.
123 112 or 113 or 114 or 115 or 116 or 117 or 118 or 119 or 120 or 121 or 122
124 111 and 123
125 controlled before-after study.mp.
126 controlled before-after stud*.mp.
127 (controlled before and after stud*).mp.
128 CBA stud*.mp.
129 before-after study.mp.
130 before-after studies.mp.
131 125 or 126 or 127 or 128 or 129 or 130
132 111 and 131
133 exp Prospective Studies/ or prospective studies.mp.
134 prospective study.mp.
135 longitudinal studies.mp. or exp Longitudinal Studies/
136 133 or 134 or 135
137 111 and 136
138 124 or 132 or 137

Appendix 5. COCHRANE CENTRAL search strategy

Workplace Violence OR Violence OR violen* OR aggress* OR angry OR hostil* OR “inappropriate behavio?r” OR bullying OR pester* OR Bullying OR Aggression OR Hostility OR inappropriate behavio?r OR (mob or mobs or mobbing) OR Agonistic Behavior OR harass* OR disrupt* OR incivility OR abus* OR assault OR Violence

AND

Health Occupations OR Allied Health Occupations OR health personnel OR Health Personnel OR personnel, hospital OR Personnel, Hospital OR health care worker OR health care workers OR health care personnel OR health-personnel OR health provider OR health providers OR health care provider OR health care providers OR health staff OR health care staff OR healthcare staff OR health professional OR health care professional OR healthcare professional OR health worker OR medical staff OR medical personnel OR medical professional OR medical worker OR medical provider OR military-medical personnel OR Physicians OR physicians OR Physician OR doctor OR practitioner OR clinician OR nurses OR Nurses OR nurse OR nursing staff OR nursing assistant OR nursing assistants OR Nurses’ Aides OR Nurse Midwives OR midwife OR midwives OR Dentists OR dental personnel OR Dental Staff OR dentist OR dentists OR dental assistant OR dental assistants OR Dental Assistants OR Pharmacists’ Aides OR Pharmacists OR pharmacist OR physical therapists OR Physical Therapists OR physical therapist OR physiotherapist* OR therapist* OR Physical Therapist Assistants OR technician* OR radiographer OR radiographers OR emergency medical services OR Emergency Medical Services OR Patient Transfer OR “Transportation of Patients” OR transporting patients

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OR patient transport OR Allied Health Personnel OR paramedic* OR paramedical personnel OR emergency department OR Emergency Service, Hospital emergenc* OR health manager OR health care manager OR healthcare manager OR clinical officer OR reception

AND

Organizational Policy OR Policy OR organi?ational polic* OR policy OR interven* OR policies OR management OR Safety Management OR Safety Management OR Staff Development OR Staff Development OR Inservice Training OR Inservice Training OR professional development OR program* OR aggression management OR reduction OR evaluation OR decreas* OR (prevention and control) OR measures OR improv*

AND

Randomized Controlled Trials as Topic OR randomi?ed controlled trial OR randomi?ed OR placebo OR controlled clinical trial OR Controlled Clinical Trial OR Clinical Trials as Topic OR randomly OR trial OR Random Allocation OR randomi?ation OR Randomized Controlled Trial OR controlled before-after study OR Controlled Before-After Studies OR controlled before-after stud* OR "controlled before and after stud*" OR CBA stud OR before-after study OR before-after studies OR prospective studies OR Prospective Studies OR prospective study longitudinal studies OR Longitudinal Studies

Appendix 6. OSHUPDATE search strategy

Results from OSH UPDATE + FIRE

#1 GW{Workplace Violence OR Violence OR violen* OR aggress* OR angry OR hostil* OR "inappropriate behavio?r" OR bullying OR pester* OR Bullying OR Aggression OR Hostility OR inappropriate behavio?r OR (mob or mobs or mobbing) OR Agonistic Behavior OR harass* OR disrupt* OR incivility OR abus* OR assault OR Violence}

#2 GW{Health Occupations OR Allied Health Occupations OR health personnel OR Health Personnel OR personnel, hospital OR Personnel, Hospital OR health care worker OR health care workers OR health care personnel OR health-personnel OR health provider OR health providers OR health care provider OR health care providers OR health staff OR health care staff OR healthcare staff OR health professional OR health care professional OR healthcare professional OR health worker OR medical staff OR medical personnel OR medical professional OR medical worker OR medical provider OR military-medical personnel OR Physicians OR physicians OR Physician OR doctor OR practitioner OR clinician OR nurses OR Nurses OR nurse OR nursing staff OR nursing assistant OR nursing assistants OR Nurses' Aides OR Nurse Midwives OR midwife OR midwives}

#3 GW{Dentists OR dental personnel OR Dental Staff OR dentist OR dentists OR dental assistant OR dental assistants OR Dental Assistants OR Pharmacists' Aides OR Pharmacists OR pharmacist OR physical therapists OR Physical Therapists OR physical therapist OR physiotherapist* OR therapist* OR Physical Therapist Assistants OR technician* OR radiographer OR radiographers OR emergency medical services OR Emergency Medical Services OR Patient Transfer OR "Transportation of Patients" OR transporting patients OR patient transport OR Allied Health Personnel OR paramedic* OR paramedical personnel OR emergency department OR Emergency Service, Hospital emergenc* OR health manager OR health care manager OR healthcare manager OR clinical officer OR reception}

#4 GW{#2 OR #3}

#5 GW{#1 AND #4}

#6 GW{Organizational Policy OR Policy OR organi?ational polic* OR policy OR interven* OR policies OR management OR Safety Management OR Safety Management OR Staff Development OR Staff Development OR Inservice Training OR Inservice Training OR professional development OR program* OR aggression management OR reduction OR evaluation OR decreas* OR (prevention and control) OR measures OR improv*}

#7 GW{#5 AND #6}

#8 GW{Randomized Controlled Trials as Topic OR randomi?ed controlled trial OR randomi?ed OR placebo OR controlled clinical trial OR Controlled Clinical Trial OR Clinical Trials as Topic OR randomly OR trial OR Random Allocation OR randomi?ation OR Randomized Controlled Trial}

#9 GW{#7 AND #8}

#10 GW{controlled before-after study OR Controlled Before-After Studies OR controlled before-after stud* OR "controlled before and after stud*" OR CBA stud OR before-after study OR before-after studies}

#11 GW{#7 AND #10}

#12 GW{prospective studies OR Prospective Studies OR prospective study longitudinal studies OR Longitudinal Studies}

#13 GW{#7 AND #12}

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#14 GW{#9 OR #11 OR #13}

Appendix 7. CINAHL search strategy

Interface – EBSCOhost. Research Databases Search Screen – Advanced Search. Database – CINAHL

Search no. Keyword
1 (MH "Workplace Violence")
2 (MH "Violence")
3 violen*
4 aggress*
5 angry
6 hostil*
7 “inappropriate behavio#r"
8 bullying
9 pester*
10 (MH "Bullying")
11 (MH "Aggression")
12 "Hostility"
13 inappropriate behavior
14 (mob or mobs or mobbing)
15 "Agonistic Behavior"
16 harassment
17 disrupt*
18 incivility
19 abus*
20 assault*
21 "Violence"
22 S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14 OR S15 OR S16 OR S17 OR S18 OR S19 OR S20 OR S21
23 (MH "Allied Health Professions") OR (MH "Health Occupations")
24 health personnel
25 (MH "Personnel, Health Facility") OR "personnel, hospital"
26 health care worker
27 health care workers
28 health care personnel
29 health personnel
30 health providers
31 health providers
32 health care providers
33 health care providers
34 health staff
35 health care staff
36 healthcare staff
37 health professionals
38 health care professional
39 healthcare professionals
40 health workers
41 medical staff
42 medical personnel
43 medical professionals
44 medical workers
45 medical providers
46 military medical personnel
47 (MH "Physicians") OR "Physicians"
48 Physician
49 doctors
50 practitioner
51 clinician
52 (MH "Nurses") OR "Nurses"
53 nurse
54 nursing staff

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55 nursing assistant
56 nursing assistant
57 (MH "Nursing Assistants") OR "Nurses' Aides"
58 (MH "Nurse Midwives") OR "Nurse Midwives"
59 midwife
60 midwives
61 "dental personnel"
62 (MH "Dentists") OR "dentists"
63 dentist
64 dental assistant
65 (MH "Dental Assistants") OR "Dental Assistants"
66 (MH "Pharmacists") OR (MH "Pharmacy Technicians")
67 pharmacist
68 (MH "Physical Therapists") OR "Physical Therapists"
69 physical therapist
70 physiotherapist*
71 therapist*
72 (MH "Physical Therapist Assistants") OR "Physical Therapist Assistants"
73 technician*
74 radiographer
75 radiographer
76 (MH "Emergency Medical Services") OR "Emergency Medical Services"
77 (MH "Transportation of Patients") OR "transporting patients"
78 patient transport
79 (MH "Allied Health Personnel") OR "Allied Health Personnel"
80 paramedic*
81 paramedical personnel
82 (MH "Emergency Service") OR "emergency department"
83 emergenc*
84 health manager
85 health care manager
86 healthcare managers
87 clinical officer
88 reception
89 S23 OR S24 OR S25 OR S26 OR S27 OR S28 OR S29 OR S30 OR S31 OR S32 OR S33 OR S34 OR S35 OR S36 OR S37 OR S38 OR S39 OR S40 OR S41 OR S42 OR S43 OR S44 OR S45 OR S46 OR S47 OR S48 OR S49 OR S50 OR S51 OR S52 OR S53 OR S54 OR S55 OR S56 OR S57 OR S58 OR S59 OR S60 OR S61 OR S62 OR S63 OR S64 OR S65 OR S66 OR S67 OR S68 OR S69 OR S70 OR S71 OR S72 OR S73 OR S74 OR S75 OR S76 OR S77 OR S78 OR S79 OR S80 OR S81 OR S82 OR S83 OR S84 OR S85 OR S86 OR S87 OR S88
90 S22 AND S89
91 (MH "Organizational Policies")
92 (MH "Policy Making")
93 organi?ational polic*
94 policy
95 interven*
96 policies
97 management
98 (MH "Occupational Safety") OR "Safety Management"
99 (MH "Staff Development") OR "Staff Development"
100 "Inservice Training"
101 professional development
102 program*
103 aggression management
104 reduction
105 evaluation
106 decreas*
107 (prevention and control)
108 measure
109 improv*
110 S91 OR S92 OR S93 OR S94 OR S95 OR S96 OR S97 OR S98 OR S99 OR S100 OR S101 OR S102 OR S103 OR S104 OR S105 OR S106 OR S107 OR S108 OR S109
111 S90 AND S110
112 (MH "Randomized Controlled Trials")

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113 "randomi?ed controlled trial"
114 randomized
115 placebo
116 "Controlled clinical trial"
117 (MH "Clinical Trials")
118 randomly
119 trial
120 "Random Allocation"
121 randomization
122 (MH "Randomized Controlled Trials")
123 S112 OR S113 OR S114 OR S115 OR S116 OR S117 OR S118 OR S119 OR S120 OR S121 OR S122
124 S111 AND S123
125 (MH "Controlled Before-After Studies") OR "controlled before-after study"
126 controlled before-after stud*
127 “controlled before and after stud*”
128 CBA stud*
129 before-after study
130 before-after studies
131 S125 OR S126 OR S127 OR S128 OR S129 OR S130
132 S111 AND S131
133 "prospective studies"
134 prospective study
135 "longitudinal studies"
136 S133 OR S134 OR S135
137 S111 AND S136
138 S124 OR S132 OR S137

HISTORY

Protocol first published: Issue 5, 2017
Review first published: Issue 4, 2020

CONTRIBUTIONS OF AUTHORS

Conceiving the protocol: ES, BT, PO

Designing the protocol: ES, BT, PO, DF, BM, SB

Co-ordinating the protocol: ES

Designing search strategies: ES, BT

Writing the protocol: ES, BT, PO, DF, BM, SB

Providing general advice on the protocol: DF, PO, BM, SB

DECLARATIONS OF INTEREST

Evelien Spelten: none known

Brodie Thomas: none known

Peter O'Meara: I have published a paper with Professor Maguire on paramedic safety. I am currently undertaking a research project titled 'Violence against paramedics' that is funded by the Falck Foundation.

Brian Maguire: I have an interest in violence in the workplace and I have published extensively in this area of interest, with a focus on occupational violence against paramedics. I am currently undertaking a research project with Professor Peter O'Meara titled 'Violence against paramedics' that is funded by the Falck Foundation.

Deirdre FitzGerald: I have published a paper on the incidence of violence in community pharmacies in the Republic of Ireland.

Stephen Begg: none known

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SOURCES OF SUPPORT

Internal sources

- None, Other

External sources

- No sources of support supplied

DIFFERENCES BETWEEN PROTOCOL AND REVIEW

Included participants

In the protocol we only distinguished the healthcare worker as a participant. However, it became clear that studies can focus on the worker, the patient and the environment in which aggression takes place as units of analysis. We made the following adjustment.

Studies into workplace aggression investigate different aspects of violence. In terms of the Haddon Matrix (Haddon 1980), the focus can be on:

1. the victim of the aggression: the healthcare worker;
2. the vector of the aggression: the patient or a patient advocate;
3. the environment in which the aggression takes place, e.g. the occurrence of violence in a specific healthcare setting, or ward.

We included studies on all three aspects. We included patients and patient advocates as participants. We included adult healthcare workers of any gender or profession who interact with patients, their advocates, or both as participants. This included at least: physicians and physician assistants; dentists; nurses and midwives; pharmacists; paramedics; allied health professionals (e.g. physiotherapists, occupational therapists, speech pathologists, speech and language therapists, medical imaging practitioners, oral hygienists, podiatrists, dietitians, opticians, audiologists); and healthcare support personnel (e.g. reception staff, healthcare aides or assistants, healthcare security personnel). We included any public or private healthcare facility or unit as an environment.

Exclusion criteria

We excluded chemical sedation for agitation as an organisational intervention. We considered chemical sedation to be a clinical intervention and it is the subject of several other Cochrane Reviews (Ahmed 2010; Baillon 2018; Huband 2010; Huf 2016; Khokhar 2016; Livingstone 2015; Martinón-Torres 2004; Ostinelli 2017; Ostinelli 2018a; Ostinelli 2018b; Seitz 2011; Zaman 2017). The outcome measures for the studies did not match those for our protocol, as they either assessed the duration of an aggressive episode or the reduction in an aggression score, instead of measuring the number of episodes of aggression.

NOTES

Parts of the methods section and Appendix 1 of the protocol are based on a standard template established by Cochrane Work Review.

INDEX TERMS

Medical Subject Headings (MeSH)

Emergency Service, Hospital; *Health Personnel; Nursing Homes; *Organizational Policy; *Patient Advocacy; *Patients; Randomized Controlled Trials as Topic; Workplace Violence [*prevention & control] [statistics & numerical data]

MeSH check words

Humans

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