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Title: Learning and performance outcomes of mental health staff training in de-escalation techniques for the management of violence and aggression

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ABSTRACT

Background: De-escalation techniques are a recommended non-physical intervention for the management of violence and aggression in mental health. Although taught as part of mandatory training for all NHS mental health staff, there remains a lack of clarity around training effectiveness.

Aim: To conduct a systematic review of the learning, performance and clinical safety outcomes of de-escalation techniques training.

Method: The review process involved a systematic literature search of 20 electronic databases, eligibility screening of results, data extraction, quality appraisal, and data synthesis.

Results: 38 relevant studies were identified. The strongest impact of training appears to be on de-escalation-related knowledge, confidence to manage aggression and de-escalation performance (although limited to artificial training scenarios). No strong conclusions could be drawn about the impact of training on assaults, injuries, containment and organisational outcomes owing to the low quality of evidence and conflicting results.

Conclusions: It is assumed that de-escalation techniques training will improve staff's ability to de-escalate violent and aggressive behaviour and improve safety in practice. There is currently limited evidence that this training has these effects.

Declaration of interest: Owen Price has received a Doctoral Research Fellowship from the National Institute of Health Research to explore ways of improving mental health staff use of de-escalation techniques. This review represents one part of the fellowship project. The authors declare no other relevant interest.

<INSERT BOX 1 HERE>

BACKGROUND

Violence and aggression occur frequently in mental health settings (1) and are associated with significant individual costs to those assaulted, as well as substantial economic costs to the health service (2). Serious service user safety concerns have been reported about the use of physical restraint to manage violence and aggression in these settings, including death as a result of positional asphyxia (3) and symptoms of post-traumatic stress (4). Such serious consequences have resulted in the prioritisation of non-physical approaches, such as de-escalation techniques, **in both US** (5) and UK violence and aggression management policy (6). De-escalation techniques aim to stop the escalation of aggression to either violence or the use of physically restrictive practices via a range of psychosocial techniques (7). These typically involve the use of non-provocative verbal and non-verbal clinician communication to negotiate a mutually agreeable solution to the aggressor's concerns (8). Evidence of wide variation in skill levels among staff (9) may be a barrier to the effectiveness of these techniques, and suggests a potentially influential role for training in addressing skills deficits and their associated harms. Although training in de-escalation techniques is now a key component of mandatory conflict resolution training for NHS mental health staff (10), little is known about its effectiveness in terms of improved performance and reduction of harm associated with violence and aggression. To address this important evidence gap, this review systematically evaluates current evidence for de-escalation techniques training.

DE-ESCALATION TECHNIQUES TRAINING - MODE OF ACTION

To inform a robust evaluation of the evidence, it is important to first develop a conceptual understanding of training function. Effective training has previously been conceptualised as a series of cognitive (knowledge, self-awareness, self-regulation), affective (enhanced motivation, self-efficacy) and skills-based improvements, combined with a transfer of learning to improved job performance (11). This review will use this framework to evaluate the effectiveness of de-escalation techniques training. The literature suggests that staff de-escalation techniques may be influenced either directly, through skills-teaching (12) or, indirectly, through modification of staff attitudes to service users, the nature of their mental health problems and their attributions as to the causes of aggression (13, 14). Both approaches are thought to improve interpersonal styles when faced with aggression, reducing the risk of assault (table 1). This review will incorporate the evaluation of both approaches, which can be delivered either individually or in combination.

<INSERT TABLE 1 HERE>

AIM

To evaluate the effectiveness of de-escalation techniques training through direct skills-teaching and/or staff attitude modification.

OBJECTIVES

- To identify potential moderators of the effectiveness of training.
- To identify evidence of the acceptability of training interventions.

REVIEW METHODS

SEARCH STRATEGY

Search terms were developed to answer the review objectives using the key concepts of mental health, staff attitudes, de-escalation techniques, training, and violence (full strategy available upon request).The search strategy was subject to a preliminary validity check and then applied to: AMED, ASSIA, Social Services Abstracts, British Nursing Index (and archive), EMBASE, MEDLINE, PsycINFO, Cochrane Library (all sources), SSCI + SCIEXPANDED, CINAHL, metaRegister of Controlled Trials; all from database inception to **August 2014**. After eligibility screening and obtaining the final sample of included studies, each study's reference list was screened to identify further studies that had not been identified (figure 1).

SELECTION CRITERIA

Inclusion criteria

Population

- Healthcare staff working with adult populations with mental health problems aged (18-65).

Intervention

- Training with a de-escalation techniques component.
- Training aiming to reduce violence and aggression AND/OR improve de-escalation skills through modification of staff attitudes.

Design

- **Quantitative studies evaluating training effectiveness and/or moderators of effectiveness**
- Qualitative studies examining acceptability of training interventions.

Outcomes

- **Cognitive, affective, skills-based, clinical and organisational outcomes of training (as per table 1)**

Exclusion criteria

Population

- Training of non-healthcare staff (police, security staff).
- Non-working age service users.
- Learning disabilities services.

Intervention

- **Training without de-escalation techniques or attitudinal component.**

Design

- Non-primary research (reviews, opinion, discussion papers).
- Grey literature

Outcomes

- **Implementation studies providing no data on effectiveness, moderators or acceptability.**
- **Evaluations aiming to modify staff attitudes to aggression without investigating the resultant impact on de-escalation performance or clinical outcomes.**

ELIGIBILITY SCREENING

Duplicates were removed and screening conducted on titles and abstracts and full text according to the eligibility criteria. Selection of full text articles were independently verified by two researchers.

DATA EXTRACTION

Extracted data were assigned to five categories of outcome: cognitive, affective, skills-based, and clinical and organisational outcomes (table 1). Moderators were extracted at staff level, service user level, organisational level, environmental level and training level (characteristics of training). Further data extracted included: acceptability of interventions, contextual information about the design and delivery of interventions, and design of the studies. Verification of extractions was completed independently by two researchers. The team met and potential errors/disagreements were resolved through team consensus (Data extraction tables are available on request).

QUALITY APPRAISAL

The methodological quality of included quantitative studies was appraised using the 'Quality Assessment Tool for Quantitative Studies' (15). This tool rates quality in six domains: selection bias, study design, confounders, blinding, data collection methods, study withdrawals/dropouts, and

demonstrates acceptable construct validity and inter-rater reliability (Kappa= between 0.61 and 0.74) (15). Quality assessment decisions were independently verified by two researchers who met and potential errors/disagreements were discussed and resolved through third party consensus. Quality of moderator analyses was assessed using four key criteria suitable for use with non-randomised studies. These were: the validity of tools used to detect moderators; the number of potential moderators tested (measuring fewer variables may enhance the reliability of predictor effects); hypothesis of predictor effects determined a priori (i.e. findings are confirmatory rather than exploratory); analysis involves direct testing of the relationship between the predictor and the independent variable (16). Quality of qualitative acceptability data was assessed using the COREQ, a checklist for appraisal of qualitative studies across three domains: (i) research team and reflexivity, (ii) study design and (iii) data analysis and reporting (17).

DATA SYNTHESIS

Qualitative and quantitative data were analysed separately. **An initial scoping review of the available evidence revealed substantial heterogeneity of study designs and, with such small number of eligible studies returned for each outcome category, conducting a meaningful meta-analysis was impossible.** All quantitative data was tabulated according to key training outcomes (cognitive, affective, skills-based, and clinical and organisational outcomes). Standardised Effect Sizes (Cohen's d) were calculated for papers reporting data appropriately. Effect sizes were not calculated when no means and SDs were reported or when the product of a statistical test was omitted. **There was insufficient qualitative data to subject it to formal qualitative data analysis. The few open-ended comments about the training that were identified, were organised into themes and agreed by the review team.** Quantitative and qualitative data were then synthesised into narratives for each of the relevant outcomes.

RESULTS

<INSERT FIGURE 1 HERE>

SEARCH RESULTS

The search identified **38** relevant studies from **10174** hits (Figure 1). 26 studies were focused on direct skills-teaching, **6** studies aimed to influence either de-escalation performance or reduce violence and aggression through modification of staff attitudes, and 6 used a combination of both approaches **(Table 2).** There were **23** uncontrolled cohort studies, 12 controlled cohort studies, and 3 case control studies **(Table 2)**. No RCTs, the gold standard for intervention effectiveness, were identified. Studies were predominantly conducted in the United States (n=10) or the United Kingdom (n=14). Samples were biased toward unqualified staff (64% unqualified versus 36% qualified) and student nurse populations (39% of the total trained participants). 7 studies provided a rudimentary qualitative evaluation of training acceptability (18-24).

<INSERT TABLE 2 HERE>

Heterogeneity of intervention intensity and content

Potentially important variations were identified in training intensity and content. 10 studies provided high intensity training (defined as >1 week's formal training), **11** studies provided medium intensity training (defined as > 1 day's and <1 week's formal training) and 9 studies provided low intensity training (defined as <1 day's formal training) **(Table 2)**. Level of intensity was unclear due to

inadequate reporting in 3 studies and due to the informal nature of the training in a further 5 studies **(Table 2)**. Secondly, there was variation both in the de-escalation techniques taught and the amount and content of adjunct training delivered. A full description of these differences is provided in tables 3 and 4).

<INSERT TABLE 3 HERE>

<INSERT TABLE 4 HERE>

QUALITY APPRAISAL

Overall the quality of the studies was moderate to weak. 1 study was rated as strong, 18 as moderate and **19** as weak **(Table 5)**. Judgement of the representativeness of study samples was, in many cases, problematic. Often, studies failed to report how participants, wards or hospitals were recruited and only 11/37 studies reported response rates. Of those, seven had rates of uptake between 80-100%, although none provided data on non-respondents **(Table 5)**. Although a number of the studies either reported potentially confounding differences between intervention and control groups at baseline or between service configuration or delivery models pre-and-post intervention (9, 18, 25-34), these were often not adjusted for in the analysis (18, 27, 29-34). Where wards or units were the units of allocation and/or analyses, insufficient information was provided about the baseline equivalence of these (35, 36). A number of uncontrolled studies failed to report on possible population/organisational differences between pre-and-post intervention periods (22-24, 37-40). The eight studies reporting participant withdrawals **(Table 5)** had a mean retention rate of 72.7% (SD19.66, range 32-91.1%).

Included studies examining intervention effectiveness were limited by the absence of active controls in all but two studies (31, 41). Four studies where de-escalation performance was rated by independent assessors reported good blinding procedures (9, 28, 29, 31). Studies frequently failed to evidence adequate validity and reliability of outcome measures **(Table 5)**. Of nine studies providing evidence of potential moderators of effectiveness (9, 20, 28, 29, 31, 32, 42-44), only three (9, 20, 28) met at least three of the four key quality criteria for moderator analyses. Of the seven studies providing a qualitative evaluation of the acceptability of training (18-24), none provided sufficient methodological detail to meet any of the COREQ quality standards.

<INSERT TABLE 5 HERE>

MAIN OUTCOMES

Direct skills-teaching as a predictor of improved de-escalation performance and related outcomes

Cognitive outcomes

Included studies generally supported the capacity of training to enhance de-escalation-related knowledge. Of five studies providing pre/post training data on this outcome, the four of comparable study quality (moderate) and training intensity (medium) (20, 31, 45, 46), were consistent in finding large (ES 0.91 (31), ES 1.13 (20), ES 1.39 (45)) and significant de-escalation-related knowledge gains associated with training (20, 31, 45, 46). The final study, using a low intensity intervention, found no effect (ES -0.14) on knowledge (47).

Moderators of cognitive outcomes

There was no evidence of differences in knowledge gains between professional groups pre-and-post training (20) but a regression analysis found staff occupation, rather than current level of clinical exposure to aggression predicted baseline level of de-escalation knowledge (20). This suggests that experience and prior training, rather than exposure to aggression predicts de-escalation knowledge (20). As might be expected, staff with no prior training improved the most (20).

Affective outcomes

Findings were consistent across study design, quality and training intensity in supporting increased confidence to manage aggression associated with training. Nine of ten studies reported significantly increased confidence post training (21, 28, 31-33, 45, 48-50). However, effect sizes were only calculable for four studies, with two negligible effects (ES<0.2) (32, 45), one medium-sized effect (ES0.76) (31) and one large (ES1.04) (50). Increases in confidence after training was reported elsewhere but the significance of this finding was not evaluated (22). Surprisingly, given the evidence of increased confidence, there was no evidence that the training impacted on subjective anxiety regulation in the management of aggression (19, 29, 32, 43), although one study reported a medium sized (ES0.54) non-significant reduction in feelings of anxiety post-training (29). There was some, albeit limited, evidence that training may, in the short term, sensitize participants to the risk of assault and increase anxiety (32).

Moderators of affective outcomes

Three studies revealed potential moderators of affective outcomes. As expected, more experienced staff had the highest levels of confidence to manage aggression (32). Staff working in areas of greatest acuity appear to benefit most in terms of confidence gains from training (31), and male participants may rate themselves as more able to regulate anxiety when faced with aggression than female participants (42).

Skills-based outcomes

The six studies investigating skill improvements, varied in both study quality and training intensity but generally supported the capacity of training to improve de-escalation performance. Four studies reported significant objectively measured post-training improvements (9, 29, 31, 46) (effect sizes calculable for only two studies both demonstrating large effect sizes >0.8 (29, 31)); and there also was evidence of self-rated improvements (19). Negative findings included: reduction in self-rated de-escalation ability after training (43) and objectively measured improvements not reflected in participants' subjective ratings (29).

Moderators of skills-based outcomes

There was evidence that neither confidence (28) nor anxiety regulation (29, 32) may be reliable predictors of de-escalation performance and that the ability to interpersonally relate to aggressive service users has the more pivotal role (28, 32). No relationship between age, experience or previous education and de-escalation performance was identified (9). The largest gains in de-escalation performance were found in trainees with the lowest baseline performance (9). Males and trainees with previous violence and aggression training attendance had higher self-rated de-escalation ability (42).

Clinical outcomes

Assault rate

Irrespective of study design, quality or training intensity, findings for this outcome were mixed. No clear evidence of the impact of this training on assault rate could therefore be derived. Of five studies measuring risk of assault at ward level, three found a significantly reduced risk of assault (26, 27, 31) and two found no significant effect (34, 36). Three studies measured the risk of assault at the level of individual staff and only one (30) found a significant reduction (ES0.77), with two reporting no effect of training (26, 27).

Incidence of aggression

Eleven studies investigated the impact of training on aggressive incidents more broadly, which included verbal aggression and violence toward objects. **Findings were often negative, irrespective of training intensity or study quality,** with studies either reporting no effect on incident rate or severity (25, 34, 36, 41), or increases in aggression post-training (likely due to improved reporting post training) (39). There was even evidence that de-escalation trained wards increased staff risk exposure to being involved in an aggressive incident when compared to Control and Restraint trained wards (35), but there was a high risk of other programmatic or organisational variables being responsible for this outcome. Again, there was evidence of a significant reduction in incident rates measured at ward level (26, 31) **in two studies of moderate quality**, one of these demonstrating a medium effect size (ES0.64) (31). Significant reductions in severity of incidents were also reported (26, 36), although the significance of this effect was marginal (P=0.52) in one of these (36). Three weak studies reported reductions in incident rate but failed to evaluate the significance of these effects (22-24).

Injuries

Results were again mixed, although the stronger two of four studies evaluating this outcome demonstrated positive effects in reducing injuries (30, 41). There was evidence of a significant and large (ES1.13) reduction in wards with high compliance with training compared with low compliance wards and the active control (CPR training) (41). This reduction was not found at individual staff level where the training was marginally outperformed by the active control in terms of reduced risk of injury (training ES0.3, CPR ES0.37); **although a significant reduction at individual staff level was found in another study of similar design and quality (30). Two weak studies found no effect on injury rates (38, 39).**

Containment

The four studies investigating impact of training on use of physical restraint all demonstrated reductions associated with training (25, 26, 37, 38). However, interpretation of these findings were limited by poor study quality (37, 38) and , in one instance, wide confidence intervals (CI=0.168-0.940) (25). A non-significant reduction in the use of rapid tranquilisation (25) and no effect on the supply of extra medication (31) were also reported.

Moderators of clinical outcomes

No moderators of clinical outcomes were identified.

Organisational outcomes

A range of organisational benefits were reported among six studies that provided data on this outcome. These included a highly significant, large (ES1.47) reduction in lost workdays (31) and two weak studies also supported this finding but failed to evaluate significance (18, 39). Further benefits, reported without evaluating significance, included: improved staff retention (18), reduced complaints (18), and reduced overall expenditure (18, 39). There were negative findings, including a non-significant increase in sick leave (34), and increased service user hospitalisation periods for de-escalation trained wards compared with control and restraint trained wards (35). However, variation in programmatic or organisational variations between study sites limits the interpretation of these data. No moderators of organisational outcomes were identified.

Attitudinal change as a predictor of improved de-escalation related outcomes

No study of moderate quality or above provided any evidence of attitudinal change impacting de-escalation performance or rates of violence and aggression (13, 49, 51, 52). Of three studies that used adequately validated scales, one measured attitudes toward service users in general (52) and two measured attitudes toward aggression (13, 49). Improvements in de-escalation performance were assumed via measured increases in confidence to manage service user aggression (49) via preference for aggression management method (an increase in preferences for non-physical methods indicating a positive result) (13), or via reductions in staff-patient conflict (52).

None of these studies influenced staff attitudes in the hypothesised direction (13, 49, 52). Noting this, there were anomalous findings: desirable outcomes (increased confidence to manage aggression (49)) and reduced staff-patient conflict (52) (although with a negligible effect size ES0.13) were achieved independently of attitudinal change. It should be noted that when this study was repeated using a more rigorous, controlled design, no effect on conflict was observed (51). Evidence to support attitudinal change to service user aggression as a mechanism for improving de-escalation related outcomes was only found in weak studies (19, 22, 40, 44, 50, 53).

Moderators of attitudinal change

Potential moderators of attitudinal change were evident from three studies (42-44). Staff may attribute more blame for aggression to younger service users than older service users (42, 43), but attitudes to aggression in younger service users may be more amenable to change through training (42, 43). Older staff attributed less blame to aggressive service users than did younger participants (42) and nurses with more clinical experience may be more likely to have positive attitudes toward service user aggression (44). Blame attributions were found to have increased at clinical placement follow up from post-training scores in two studies, suggesting either: a negative interaction between attitudes to aggression and exposure to clinical placement, or, a reduction in effect over time (42, 44). No conclusions could be made about the relationship between exposure to previous aggressive incidents and blame attribution (42).

Acceptability of training interventions

Seven studies provided some rudimentary qualitative evaluation of training interventions but were weak in methodological quality. All studies, except one, in which a large number of participants perceived no impact of the training on their practice (21), reported positive views of the training. The reasons for the negative finding were not established (21). Improvements participants felt were important for the training included the following four themes:

Duration and frequency of training

The participants expressed the importance of increasing the frequency of training and regular refresher courses to maintain learning (18, 20, 22, 24).

Delivery methods

Participants felt that the training should be relevant to the clinical context in which they work (20) and that trainer supervision and feedback on actual clinical interactions would be useful (18, 20). They wanted a stronger emphasis on role plays and a broad spectrum of case studies (20, 24) and there was a preference for live demonstrations rather than videotaped scenarios (24). They also wanted a written manual on de-escalation to keep with them on the wards (18). The importance of delivering training to all levels of the MDT and training whole wards together to enable team approaches was emphasised (22, 23).

Intervention content

There was evidence of a perceived need for training content that considered aggression from a range of perspectives i.e. aggression motivated by both illness and non-illness factors (20).

Facilitator attributes

Participants wanted trainers to have practice credibility i.e. current ward experience so that training content could be directly linked to situations participants experience on the wards (20).

DISCUSSION

This review has synthesised the available evidence pertaining to de-escalation techniques training. There was insufficient evidence to consistently demonstrate cognitive, affective, skills-based improvements and transfer to enhanced job performance either through direct skills-teaching or attitude modification. De-escalation techniques are interventions predicated on a desire to enhance safety through reducing violence and the physical and psychological harms associated with it. It is thus, somewhat surprising, that only 18/**38** included studies measured effectiveness via key safety outcomes such as rates of violence and aggression and/or the use of potentially harmful (3) containment strategies such as physical restraint. Furthermore, a large proportion of the included studies were rated as methodologically weak. Therefore, given the limited quality of the existing evidence, only tentative conclusions can be drawn about the effectiveness of this intervention.

Direct skills-teaching

The strongest impact of training was on de-escalation knowledge and participant confidence to manage aggressive behaviour. There was evidence that confidence alone may not be particularly

useful in terms of predicting improvements in actual behaviour when faced with aggression. There may be no relationship between confidence to manage aggression and de-escalation performance (28), possibly because excessive self-confidence may be perceived as threatening to the aggressor and counterproductive to de-escalation efforts (28). It is possible that qualities such as self-awareness and the ability to connect interpersonally with service users may have a more pivotal role in effective de-escalation (28, 32). Measurement of these outcomes, rather than confidence, may be more appropriate in future intervention research.

This review found consistent evidence of objectively measured improvements in de-escalation performance post-training. However, these improvements were often measured on un-validated scales and limited to artificial training scenarios. As such, little can be concluded about the effective transfer of these skills to aggressive situations during routine practice. This review identified no evidence that age, occupation, level of experience or gender are reliable predictors of de-escalation performance, **either at baseline, endpoint or in terms of extent of improvement as a result of training.** Within the limited evidence available, there is therefore nothing to suggest that clinical managers should prioritise certain subgroups of staff over others for de-escalation training.

Few strong conclusions can be drawn about the impact of training on assaults, injuries, containment and organisational outcomes owing to a) the poor quality of evidence and b) conflicting results. The most consistent evidence of impact on clinical outcomes was on rates of violence, aggression and injuries at ward rather than individual level. Wards with high compliance with training appear to benefit more from training than those with low compliance (27, 31, 41). This may be explained through wards adopting whole team approaches that are more likely to reduce the risk of assault than individual advances in knowledge and skills (41). Clinical managers should not only ensure that sufficient numbers of their staff are trained but also that as many staff as possible are trained together at the same time, to foster such approaches and facilitate maximal gain.

Attitude modification

There was little evidence to suggest that de-escalation skills may be influenced through modification of staff attitudes. No study using validated measures detected positive attitudinal changes to service users or to aggression. Although one study reported significant reductions in conflict (52), the effect size was small and the effect was not found when the study was repeated under more rigorous conditions (51). Although there was evidence of increased confidence to manage aggression following an intervention aiming to modify attitudes to service user aggression (49), given the lack of evidence of attitudinal change, it is possible that another mechanism was responsible for this positive result.

The negative findings are consistent with the broader literature, which is replete with failed attempts to modify mental health staff attitudes to service user aggression (14, 54). This may be explained, either through the inability of interventions to impact on attitudes or the inability of the available measures to detect existing attitudinal changes (54). The negative results may further reflect a more pervasive problem with stigmatising attitudes of mental health staff toward service users. Whilst there is evidence of reductions in negative attitudes toward the mentally ill among the UK public as a result of the recent 'Time to Change' public health campaign (53), the effects of the same campaign had no impact on the attitudes of mental health professionals (55). More responsive interventions to change these attitudes and potentially more sensitive tools for detecting attitudinal change are needed to support this training mechanism as a means of improving staff de-escalation techniques.

Review limitations

To limit heterogeneity of training interventions included, only studies of healthcare staff working with working age adult (18-65) populations were reviewed. It is probable that, to meet the specific needs of populations outside this group, substantial variation in training exists. This decision was therefore intended to enhance the precision of the review's findings and conclusions. However, it is accepted that this may have excluded potentially relevant data. It is also possible that the exclusion of grey literature may have excluded potentially relevant data. The inclusion criteria for included interventions were relatively broad and, as such, these included additional components delivered in conjunction with de-escalation content (such as physical restraint training). This was a pragmatic decision based on the observation that this is a) often how the intervention is delivered in practice (56), and b) these interventions make up a substantial proportion of the evaluation research on this topic. Nevertheless, this may have complicated the isolation of the effect of the de-escalation components of the interventions. However, assessments of the effectiveness of de-escalation components could often be deduced from the nature of the outcome. For example, reductions in aggressive incidents and restraint usage would likely be a consequence of enhanced de-escalation techniques rather than learnt restraint techniques. Extractions and quality appraisal decisions were verified rather than independently conducted, which may have increased the risk of error/bias at these stages. Finally, due to the nature of existing evidence, the sample of studies was biased toward unqualified and student nurse populations. These factors may have reduced the generalisability of the review findings.

Recommendations

The development of evidence-based interventions followed by feasibility studies measuring both de-escalation performance and transfer to enhanced clinical and organisational outcomes is needed. This may require either new measures of de-escalation performance or further validation of existing measures. The limited acceptability data suggest that trainees are supportive of increased use of role play, case studies and prefer facilitators with relevant practice credibility. However, no empirical evidence of the relative effectiveness of methods of delivery or facilitator attributes was identified. Future work should include qualitative inquiry exploring issues of transfer of training to improved performance and the optimum delivery methods for this form of training. As a minimum, this should be conducted with staff who receive the training and training facilitators. Training staff in non-physical conflict resolution represents a substantial and costly proportion of NHS mandatory training. It is assumed that this training may improve staff's ability to de-escalate violent and aggressive behaviour. There is currently limited evidence to suggest that this form of training has this desirable effect.

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BOXES, TABLES AND FIGURES

Moderators: baseline variables that may affect the relationship between independent and dependent variables.

Grey literature: literature published outside of conventional academic channels i.e. outside of electronic databases and online journals.

Containment: Procedures aiming to safely manage disturbed behaviour when verbal interventions have failed, such as PRN medicines and physical restraint.

Box 1   Glossary

Training approach	Cognitive outcomes	Affective outcomes	Behaviour change	Clinical outcome	Organisational outcomes
Direct skills teaching	Knowledge of behavioural skills and strategies for emotional regulation	Increased confidence/ self-efficacy	- Enhanced interpersonal style when managing aggressive behaviour - Emotionally regulated when faced with aggressive behaviour	Reduced assaults **Reduced containment usage**	Reduced expenditure
Modification of staff attitudes	Accurate understanding of the nature of service users' problems and the causes of the aggression	- Reduced negative emotions (fear/ anger/ blame) - Increased empathy	- Reduced behaviours likely to provoke escalations (avoidance/ hostility/criticism) - Understands SU needs during escalation - More compassionate responses to escalation	- Reduced escalations - Reduced assaults **Reduced containment usage**	Reduced expenditure

Table 1   **De-escalation techniques training – mode of action**

Study ref	Study country	Design	Training approach	Duration of training	Trainees
Collins 1994	United Kingdom	Cohort (pre/post)	Staff attitude modification	Not reported	26 (27 % professionals)
Whittington & Wykes 1996	United Kingdom	Controlled cohort	Direct skills-teaching	7 hours	155 (77% professionals)
Nijman et al. 1997	Netherlands	Controlled cohort	Direct skills-teaching	Two sessions (duration unclear)	Not reported
Smoot & Gonzales 1995	United States	Controlled cohort	Direct skills-teaching	32 hours	65 (professional status unclear)
Jonikas et al. 2004	United States	Cohort (pre/post)	Direct skills-teaching	7 hours	Not reported
Nau et al. 2010	Germany	Controlled cohort	Direct skills-teaching	24 hours	76 (100% non-profesionals)
Nau et al. 2011	Germany	Controlled cohort	Direct skills-teaching	24 hours	65 (100% non-professionals)
Cowin et al. 2003	Australia	Cohort (pre/post)	Direct skills-teaching	Not reported	49 (100% professionals)
Wondrak & Dolan 1992	United Kingdom	Controlled cohort	Direct skills-teaching	1.5 hours	29 (100% non-professionals)
Beech & Leather 2003	United Kingdom	Cohort (pre/post)	Combined approach	21 hours	243 (100% non-professionals)
Beech 2008	United Kingdom	Cohort (pre/post)	Combined approach	21 hours	243 (100% non-professionals)
Beech 2001	United Kingdom	Cohort (pre/post)	Combined approach	21 hours	58 (100% non-professionals)
Lee et al. 2012	United Kingdom	Case control	Direct skills-teaching	28 hours	Not reported
Infantino & Musingo 1985	United States	Case control	Direct skills-teaching	7 hours	96 (100% non-professionals)
Carmel & Hunter 1990	United States	Case control	Direct skills-teaching	6-8 hours	Not reported
Needham et al. 2004	Switzerland	Cohort (pre/post)	Direct skills-teaching	35 hours	Not reported
Rice et al. 1985	Canada	Controlled cohort	Direct skills-teaching	35 hours	135 (professional status unclear)
Martin 1995	United States	Cohort (pre/post)	Direct skills-teaching	21 hours	Not reported
Ilkiw-Lavelle et al. 2002	Australia	Cohort (pre/post)	Direct skills-teaching	14 hours	103 (53% professionals)
Paterson et al. 1992	United Kingdom	Cohort (pre/post)	Direct skills-teaching	70 hours	25 (100% professionals)
Laker et al. 2010	United Kingdom	Cohort (pre/post)	Direct skills-teaching	Not reported	Not reported
Calabro et al. 2002	United States	Cohort (pre/post)	Direct skills-teaching	10 hours	118 (50% professionals)
McIntosh 2003	United States	Controlled cohort	Direct skills-teaching	8 hours	82 (52% professionals)
Robinson et al. 2011	Australia	Cohort (pre/post)	Direct skills-teaching	Online course over 24 weeks	24 (92% professionals)

Grenyer et al. 2004	**Australia**	**Cohort (pre/post)**	**Combined approach**	**22 hours**	**63 (professional status unclear)**
Sjostrom et al. 2001	**Sweden**	**Cohort (pre/post)**	**Direct skills-teaching**	**35 hours**	**Not reported**
Thackrey et al. 1987	**United States**	**Controlled cohort**	**Direct skills-teaching**	**8 hours**	**106 (37% professionals)**
Needham et al. 2005	**Switzerland**	**Controlled cohort**	**Combined approach**	**24 hours**	**117 (100% non-professionals)**
Nau et al. 2009	**Germany**	**Cohort (pre/post)**	**Direct skills-teaching**	**21 hours**	**68 (100% non-professional**
McLaughlin et al. 2010	**United Kingdom**	**Cohort (pre/post)**	**Combined approach**	**Not reported**	**18 (56% professionals)**
Hahn et al. 2006	**Switzerland**	**Controlled cohort**	**Staff attitude modification**	**24 hours**	**63 (91% professionals)**
Moore 2010	**United States**	**Cohort (pre/post)**	**Direct skills-teaching**	**Not reported**	**Not reported**
Goodykoontz & Herrick 1990	**United States**	**Cohort (pre/post)**	**Direct skills-teaching**	**4 sessions (duration unclear)**	**27 (professional status unclear)**
Bowers et al. 2006	**United Kingdom**	**Cohort (pre/post)**	**Staff attitude modification**	**N/A (informal training model)**	**N/A (informal training model)**
Bowers et al. 2008	**United Kingdom**	**Controlled cohort**	**Staff attitude modification**	**N/A (informal training model)**	**N/A (informal training model)**
Taylor & Sambrook 2012	**United Kingdom**	**Cohort (pre/post)**	**Staff attitude modification**	**N/A (informal training model)**	**18 (professional status unclear)**
Gertz, 1980	**United Kingdom**	**Cohort (pre/post)**	**Direct skills-teaching**	**7 hours**	**Not reported**
Bjorkdahl et al. 2013	**Sweden**	**Cohort (pre/post)**	**Staff attitude modification**	**4 days (no hourly break-down)**	**Not reported**

Table 2   Study details

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Citation	Selection bias	Study design	Confounders	Blinding	Data collection methods	Withdrawals and dropouts	Global ratings
Carmel & Hunter 1990	Strong	Moderate	Strong	Moderate	Strong	Strong	Strong
Smoot & Gonzales 1995	Moderate	Moderate	Strong	Weak	Strong	Strong	Moderate
Nau et al. 2010	Moderate	Moderate	Strong	Moderate	Strong	Moderate	Moderate
Nau et al. 2011	Moderate	Moderate	Strong	Moderate	Strong	Weak	Moderate
Lee et al. 2012	Moderate	Moderate	Weak	Moderate	Strong	Strong	Moderate
Infantino & Musingo 1985	Moderate	Moderate	Weak	Moderate	Strong	Strong	Moderate
Needham et al. 2004	Moderate	Moderate	Moderate	Weak	Strong	Strong	Moderate
Rice et al. 1985	Weak	Moderate	Moderate	Moderate	Moderate	Strong	Moderate
Ilkiw-Lavelle et al. 2002	Strong	Moderate	Moderate	Weak	Moderate	Strong	Moderate
Paterson et al. 1992	Weak	Moderate	Moderate	Moderate	Moderate	Strong	Moderate
Calabro et al. 2002	Moderate	Moderate	Moderate	Weak	Strong	Moderate	Moderate
Thackrey 1987	Strong	Moderate	Moderate	Weak	Strong	Strong	Moderate
Needham et al. 2005	Moderate	Moderate	Moderate	Weak	Strong	Strong	Moderate
Nau et al. 2009	Weak	Moderate	Moderate	Moderate	Strong	Moderate	Moderate
Hahn et al. 2006	Moderate	Moderate	Moderate	Weak	Strong	Strong	Moderate
Bowers et al. 2006	Moderate	Moderate	Moderate	Moderate	Strong	Strong	Moderate
Bowers et al. 2008	Moderate	Moderate	Strong	Weak	Strong	Strong	Moderate
Laker et al. 2010	Moderate	Moderate	Moderate	Strong	Strong	Weak	Moderate
Whittington & Wykes 1996	Weak	Moderate	Weak	Weak	Strong	Strong	Weak
Nijman et al. 1997	Weak	Moderate	Weak	Weak	Strong	Strong	Weak
Jonikas et al. 2004	Weak	Moderate	Weak	Weak	Strong	Strong	Weak
Cowin et al. 2003	Moderate	Moderate	Moderate	Weak	Weak	Strong	Weak
Wondrak & Dolan 1992	Weak	Moderate	Moderate	Strong	Weak	Strong	Weak
Beech & Leather 2003	Moderate	Moderate	Moderate	Weak	Weak	Moderate	Weak
Beech 2008	Moderate	Moderate	Moderate	Weak	Weak	Moderate	Weak
Beech 2001	Moderate	Moderate	Moderate	Weak	Weak	Moderate	Weak
Martin 1995	Weak	Moderate	Weak	Weak	Weak	Strong	Weak
Grenyer et al. 2003	Weak	Moderate	Moderate	Weak	Strong	Strong	Weak
Sjostrom et al. 2001	Weak	Moderate	Weak	Weak	Strong	Strong	Weak
McLaughlin et al. 2010	Moderate	Moderate	Moderate	Weak	Weak	Weak	Weak
Moore 2010	Weak	Moderate	Weak	Weak	Weak	Strong	Weak
Goodykoontz & Herrick 1990	Weak	Moderate	Weak	Weak	Weak	Strong	Weak
Taylor & Sambrook 2012	Moderate	Moderate	Weak	Weak	Strong	Weak	Weak
Gertz 1980	Weak	Moderate	Weak	Weak	Strong	Strong	Weak
Robinson et al. 2011	Weak	Moderate	Moderate	Weak	Moderate	Strong	Weak

McIntosh 2003	**Weak**	**Moderate**	**Moderate**	**Weak**	**Strong**	**Strong**	**Weak**
Collins 1994	**Moderate**	**Moderate**	**Weak**	**Weak**	**Moderate**	**Moderate**	**Weak**
Bjorkdahl et al. 2013	**Weak**	**Moderate**	**Weak**	**Moderate**	**Strong**	**Weak**	**Weak**

Table 3   Quality appraisal outcomes

	Problem identification and when to intervene	Ensure safety pre-intervention	Non provocative verbal and non-verbal behaviour	Specific interpersonal strategies [1]	Challenging aggressive behaviour and setting limits	Cognitive-affective components [2]
Collins 1994						x
Whittington & Wykes 1996	x		x			
Nijman et al. 1997	x			x	x	
Smoot & Gonzales 1995			x	x	x	x
Jonikas et al. 2004	x		x		x	x
Nau et al. 2010	x		x	x	x	x
Nau et al. 2011	x		x	x	x	x
Cowin et al. 2003		x	x	x		
Wondrak& Dolan 1992			x	x	x	x
Beech & Leather 2003	x		x			x
Beech 2008	x		x			x
Beech 2001	x		x			x
Lee et al. 2012	x					
Infantino & Musingo 1985			x			
Carmel & Hunter 1990						
Needham et al. 2004						
Rice et al 1985		x	x	x	x	
Martin 1995	x	x			x	x
Ilkiw-Lavelle et al. 2002	x					x
Paterson et al. 1992	x		x			
Laker et al. 2010						
Calabro et al. 2002	x		x		x	x
McIntosh 2003	x		x		x	x
Robinson et al. 2011	x					
Grenyer et al. 2003	x	x	x		x	
Sjostrom et al. 2001			x			
Thackrey 1987						
Needham et al. 2005						x
Nau et al. 2009			x	x		x
McLaughlin 2010	x					x
Hahn et al. 2006	x					x
Moore 2010					x	
Goodykoontz & Herrick 1990	x	x	x		x	x

Gertz 1980			x			x
Taylor & Sambrook 2012						x
Bowers et al. 2006						x
Bowers et al. 2008						x
Bjorkdahl et al. 2013	**x**				**x**	**x**

x = training component present

[1] Specific interpersonal strategies included: problem clarification, positive reinforcement, offering alternatives, shared problem solving, and confirming messages.

[2] Cognitive-affective components included: attitudes, empathy, emotional regulation, self – awareness, and confidence.

Table 4   De-escalation components of interventions

Citation	Preventive interventions	Crisis management planning	Self-defence/ breakaway techniques	Physical restraint	Systematic recording of aggressive incidents	Post assault management	Discussion of local policies and procedures	Legal, ethical and safety issues	Team working/ team dynamics
Collins 1994									
Whittington & Wykes 1996						x		x	
Nijman et al. 1997	x	x			x	x			
Smoot & Gonzales									
Jonikas et al. 2004			x	x		x			
Nau et al. 2010			x			x			
Nau et al. 2010b			x			x			
Cowin et al. 2003									
Beech & Leather 2003			x					x	
Beech & Leather 2008			x					x	
Beech 2001			x					x	
Lee et al. 2012				x					
Infantino & Musingo 1985			x	x		x			
Carmel & Hunter 1990			x	x					
Needham et al. 2004					x	x		x	x
Rice et al. 1985			x	x				x	
Ilkiw-Lavelle et al. 2002			x			x		x	
Paterson et al. 1992			x	x				x	
Laker et al. 2010				x					
Calabro et al. 2002			x	x			x	x	x
Martin 1995			x	x			x		x
McIntosh 2003				x					
Robinson et al. 2011									
Grenyer et al. 2004						x		x	
Sjostrom et al. 2001			x			x	x		
Thackrey 1987			x	x					x
Needham et al. 2005			x			x		x	
Nau et al. 2009						x		x	
McLaughlin et al. 2010						x			x
Hahn et al. 2006						x		x	
Moore 2010									x
Goodykoontz & Herrick 1990			x						

Gertz 1980			x	x			x		x
Bowers et al. 2006	x								x
Bowers et al. 2008	x								x
Taylor & Sambrook 2012									
Wondrak & Dolan									
Bjorkdahl et al.2013	x		x	x		x	x	x	x

x = training component present

Table 5 Content delivered in conjunction with de-escalation techniques

FIGURES

Total hits = **12885**

Duplicates excluded = **2711**

Title screening = **10174**

Excluded (of no relevance) = **8927**

Abstract screening = **1247**

Excluded (of no relevance) = **1180**

Full text screen = **67**

Excluded (29):
- 5 looked at attitudes but not impact on de-escalation outcomes
- 12 non working age service user population
- 7 trained non healthcare staff (police)
- 4 foreign language studies
- 1 study provided no evidence of effectiveness/ no moderators

38 studies reference lists searched (no studies identified)

38 studies included in the final analysis:
Direct skills-teaching: 26 studies
Attitude modification: 5 studies
Combined approach: 6 studies
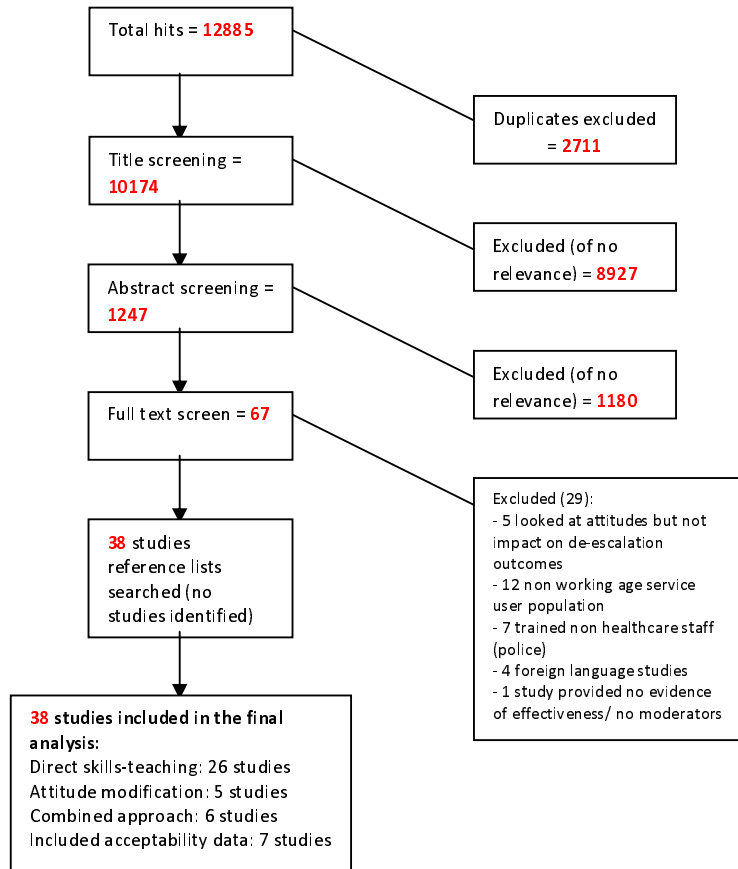Included acceptability data: 7 studies

Figure 1   Search results

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