Case study evaluating the impact of de-escalation and physical intervention training

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Keywords: acute settings, aggressive behaviour, risk management

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Accepted for publication: 3 August 2009
doi: 10.1111/j.1365-2850.2009.01496.x

Accessible summary
- The de-escalation and physical interventions training used to management violence requires careful examination to ensure its efficacy in acute inpatient settings.
- However, the evaluation of interventions to improve the safety of the inpatient services is difficult when data is recorded inconsistently or inaccurately.
- This study shows no significant differences in the number or severity of incidents before and after training in de-escalation and physical interventions.

Abstract

Violence and aggression is acknowledged as a serious issue in the mental health services. The aims are to explore whether de-escalation and physical intervention training is effective in reducing incidents and incident severity on a Psychiatric Intensive Care Unit (PICU) and to consider the cost impact. Poisson regression analysis was used to compare the number and severity of incidents on a PICU before and after de-escalation and restraint training. This study shows no significant differences in the number or severity of incidents before and after training. Objective assessment in the evaluation of interventions to improve the safety of the inpatient services is difficult when data is recorded inconsistently or inaccurately. The severity of incidents needs to be defined more fully to allow accurate measurement of the efficiency of techniques employed to resolve violence. The cost impact of training in the management of violence in relation to the benefits remains unclear in the absence of accurate data being recorded.

Background

Aggressive behaviour poses an ongoing challenge in the mental health services, with staff on Psychiatric Intensive Care Units’s (PICU) experiencing the greatest risk of physical assault (Royal College of Psychiatrists 2006). Training in the prevention and management of violent incidents is therefore of great importance and physical restraint skills are commonly employed by teams of trained staff to manage violence. The level of force applied must be justifiable, appropriate, reasonable and proportionate to the situation and should be applied for the minimum possible amount of time. (NICE 2005). The literature suggests that the benefits associated with the introduction of restraint skills in the management of violent behaviour include an increase in staff confidence towards conducting restraints safely and professionally, a decrease in the seriousness and number of assaults and assault-related injuries, and a reduction in the fear expressed by staff in their interactions with violent patients (Infantino & Musingo 1985, Paterson et al. 1992, Rosenthal et al. 1992, Collins 1994, Phillips & Rudestam 1995, Beech 1999).

However, restraint as a method of managing violence has attracted some attention in the last 10 years with...
concerns about coercion arising from its use and a strong emphasis has emerged on the need for clear policy and documentation when restraint and seclusion have occurred (Niveau 2004). Both interventions can prevent injury and reduce agitation, but the use of seclusion and restraint can also have physical and psychological effects on the patient and the staff (Fisher 1994). Furthermore, current guidelines by the National Institute for Clinical Excellence show only limited economic evaluations for the cost benefits provided by training in the management of violence.

There has been a restructuring around the techniques of restraint with a move towards de-escalation and prevention as the main focus. In a recent national report, three-quarters of nurses and clinical staff reported that they had received this training. When asked whether the training had enabled them to minimize risk and to deal with incidents, around one-fifth of nurses and clinicians felt that it had not (Royal College of Psychiatrists 2006). A lack of standardization in the way staff are targeted for courses and in the range of interventions covered has been an ongoing issue, and the effectiveness of restraint training has not yet been adequately evaluated in a clinical environment (NICE 2005). Despite a paucity of methodologically sound evidence in support of invasive treatments such as the use of restraint and seclusion it continues to be widely used (Sailas & Fenton 2008).

In May 2006, a programme of training in the Trust under study was initiated to improve the skills of the workforce in the prevention of incidents. Although the training sought to equip staff with the capability of restraining aggressive patients in a safe way, the emphasis was on de-escalation and prevention.

Aims
The first aim was to explore the efficacy of de-escalation and restraint training in reducing incidents on a PICU. The second was to explore the efficacy of de-escalation and restraint training in reducing the severity of incidents. The third was to develop a model of regression analysis to inform future research when assessing the impact of training on a non-uniformly placed outcome. Finally, the cost benefits of using de-escalation and restraint were considered.

Method
Design
The study followed a quasi experimental design. Training in an intervention to manage violence and aggression was rolled out across the Trust under study during May 2006. Therefore a sample was created around this date, starting from 11 August 2005 and ending on 1 August 2007. This allowed the formation of two groups. The pre-intervention group comprised all incidents that occurred on the unit in the 6 months preceding the implementation of the intervention and the post intervention group comprised all incidents that occurred on the unit during the 6 months after the training. The main unit of study was the incidents and the expected outcome was that there would be a reduction in the number and their severity. Ethical approval was not required as this study was conducted as an internal audit.

Participants
The sample comprised the protagonists of serious untoward incidences that occurred during the 12-month timeframe. There were 195 patients admitted to the PICU during this timeframe and 266 incidents by 86 different service users.

Inclusion Criteria
All incidents where de-escalation or restraint techniques were necessary to resolve the situation were included. All other incidents (e.g. medication errors, slips & trips, absconding) were excluded.

Analysis of Incidents Using a Poisson Model and Logistic Regression
The Poisson distribution (named after its author) describes the probabilities of independent events occurring in a fixed period of time (Long & Freese 2006). However, in this study, the number of patients and the length of time each patient spent on the ward differed between the pre-training group and the post-training group and therefore the amount of time in which an incident might have occurred (exposure time) was not comparable. Also there were incidents that were linked to the same individual in several cases.

A Poisson analysis was therefore developed that looked at the rate of incidents over the time period of exposure. Exposure was calculated for each individual as the length of time spent on the ward (admission to discharge). If the individual experienced multiple events then their exposure time was split: time from admission to first event, time between events, time to discharge and a patient level cluster term was included. Logistic regression was used to analyse the impact of training on the severity of incidents.

Although no randomization was possible on this sample, both analyses were designed to have the capability to adjust for covariates that were expected to be associated with violent incidents including age, gender, ethnicity diagnosis and substance use. The data were analysed using Stata version 10.1.
Severity of incidents

At the time of this study incidents were reported in the Trust under study using standardized forms in accordance with the regulations for the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (Health and Safety Executive 1995).

As per the incident forms, incidents were graded by severity from A to E, with A being the most severe and E being the least severe. Only incidents in category D and E existed in this data set. D is defined as a ‘moderate’ or ‘minor injury’; E is defined as ‘low’ or ‘no harm’. As these standard categories are broad and the majority of incidents in the sample fell in categories D and E, little information could be derived from them. Therefore, severity was defined for the purposes of this study using the five following indicators:

1. Was rapid tranquillization (RT) used?
2. Was restriction of free movement employed?
3. Were enhanced observations employed?
4. Were injuries sustained by either nurses or patients as a result of the incident?
5. Did the team use physical restraint, or lay ‘hands on’ (HO) the patient during the incident?

The RT refers to the emergency treatment of acute behavioural disturbance using antipsychotic medication (NICE 2009).

Results

Characteristics analysis

Socio-demographic characteristics of individuals on the ward before training and after training were tabulated.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Socio-demographics of patients on the ward before and after training</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-training</td>
</tr>
<tr>
<td>n¹</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>1 (male)</td>
<td>36 (9.6)</td>
</tr>
<tr>
<td>2 (female)</td>
<td>74 (78%)</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>British</td>
</tr>
<tr>
<td></td>
<td>Other</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>Schizophrenia related</td>
</tr>
<tr>
<td></td>
<td>Bipolar related</td>
</tr>
<tr>
<td></td>
<td>Other</td>
</tr>
<tr>
<td>Substance use</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>Cannabis</td>
</tr>
<tr>
<td></td>
<td>Alcohol</td>
</tr>
<tr>
<td></td>
<td>Polysubs</td>
</tr>
<tr>
<td></td>
<td>Heroin</td>
</tr>
<tr>
<td></td>
<td>Khat</td>
</tr>
<tr>
<td>Legal status</td>
<td>Informal</td>
</tr>
<tr>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Other</td>
</tr>
</tbody>
</table>

¹n = number of participants.

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Poisson model of impact of training on rate of aggressive incidents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Incident rate ratio</td>
</tr>
<tr>
<td>Model 1 – no adjustment</td>
<td>Training: post- versus pre-</td>
</tr>
<tr>
<td>Model 2 – adjusted for demographics</td>
<td>Training: post- versus pre-</td>
</tr>
</tbody>
</table>

 Differences were assessed using chi-square and $t$-tests (Table 1). There were three service users who were present both before and after the training. There was no significant difference in the demographics of the service users on the ward before training and those present after training (Table 1).

Poisson regression analysis

A Poisson analysis of violent incidents (Table 2, model 1) showed that rate of incidents on the ward post-training was around 1% lower than pre-training but this was not significant [incident rate ratio (IRR) = 0.986, 95% Confidence Interval (CI) = 0.75–1.29, $P = 0.920$]. To ensure that a fair comparison of the association between incident rates before and after training was investigated adjustments were made for the covariates that were expected to be associated with violent incidents: age, gender, ethnicity, diagnosis and substance use. Adjustments were made by individual covariate and including all five as a group but this made little difference to the estimate of the IRR when comparing post-training to pre-training which remained non-significant. The incident rate post training (Table 2, model
2) was now estimated to be almost 2% lower than before training but this was not significant (IRR 0.983, 95% CI 0.74–1.30, P-value = 0.905).

Analysis of severity of incidents

Logistic regression was conducted on the outcome of the incidents. The outcome was identified from the incident reports using the criteria outlined above and then dichotomized to form two main groups (‘severe’ and ‘not severe’). The ‘severe’ group (n = 92) included all incidents which involved the following outcomes: seclusion, the high dependency area (extra care area), two-to-one nursing (2 : 1), one-to-one nursing (1 : 1) and RT. The ‘not severe’ group (n = 101) included all incidents which involved the following outcomes: patient was timed out, patient was spoken to about their behaviour, patient was escorted to day area, and patient apologized.

A third group ‘other’ was created to account for all additional outcomes. This included 72 incidents with no stated outcomes and one incident where the outcome was that the patient was transferred. Lack of information meant that this third group could not be included in the analysis. There were 92 incidents in the severe group and 101 incidents in the not severe group. As in the previous analysis, some individuals had experienced multiple incidents and this was accounted for by clustering on the individual.

In total, 48 (55%) incidents pre-training were considered severe dropping to 44 (42%) post training. The odds of an incident being severe was expected to be 42% lower after de-escalation and physical intervention training though this was not statistically significant (OR 0.58, 95% CI 0.32–1.03, P = 0.064) when no covariates were included (Table 3, model 1).

Adjusting for the same covariates as previously indicated showed a non-significant reduction in odds of a severe incident after de-escalation and physical intervention training (OR 0.59, 95% CI 0.29–1.19, P = 0.142). The odds of a severe incident occurring post training was estimated to be 41% lower, but this was not significant.

Additional indicators of the severity of incidents were captured by the use of ‘RT’ and ‘HO’. The odds of an incident resulting in RT and HO before and after training were analysed using a logistic regression model, adjusting for multiple incidents by clustering on the individual.

The number of incidents resulting in RT prior to training totalled 45 (39%) compared to 51 (36%) after training, indicating a positive association. Logistic regression indicated a reduction in the proportion of incidents resulting in RT with and without adjustment for covariates, but this was not significant (Table 3). Similarly, 89 (79%) incidents resulted in HO pre-training compared with 91 (66%) post-training. This improvement was not significant before adjustment for covariates (Table 4), and became significant after adjustment (P = 0.036). However, the confidence intervals are very wide which suggests that caution should be applied when interpreting this as a significant effect.

Summary of analysis

1. The pre- and post-training groups were similar by the characteristics analysed.
2. The incident rates after training were not significantly lower than before training (IRR = 0.986, 95% CI = 0.75–1.29, P = 0.920).
3. The odds of a severe incident were not significantly lower after training than before training (Odds Ratio = 0.58, 95% CI 0.32–1.03, P = 0.064).
4. Adjustment for demographics made no difference to the conclusions drawn and had little impact on the estimates.

Cost of training

The unit under study trained all members of staff in the new de-escalation and restraint training at an estimated cost of £12 555.00. The total cost of the trainers and facilities to provide the training for this unit was £47 100.00 including an extra 20% to cover costs of venue, overheads, trainer supervision, trainer appraisals and initial training for the trainers. This was a conservative estimate and did not cover ongoing management costs.
The total costs of the replacement staff on the unit while the permanent staff were trained was £9630.25. The total staff cost for the training to the unit was therefore £69 285.25.

Discussion

Reduction in restraints and severity of incidents

The results show no significant differences in the pre- and post-training group in the reduction or severity of the number of incidents. The slight reduction in rate and severity of incidents indicated by the training may suggest that the failure to detect a difference is a reflection of small sample size. However, another implication might be that de-escalation skills were either not improved by the training or that staff found these de-escalation skills difficult to put into practice. The efficacy of the training in helping staff to manage more serious incidents also requires further consideration. The data showed that incidents were either inadequately described or individual staff members showed considerable variability in interpreting the degree of severity of the incident and consequently the proportionality of the response. While this variability may have been in direct response to the known, differing risk indicators for individual service users, the lack of data confuses the picture. The tendency towards using standard physical and pharmacological interventions post training could perhaps be overcome by increasing the use of advanced directives or crisis care plans.

Data accuracy issues

Descriptions of the incident and the outcome of the incident were insufficiently specific in some cases so that where restraint was not mentioned it was assumed that it did not happen, where medication, Pro re nata (medication as required) or RT was not mentioned, it was assumed that it was not given; and where the response team are not mentioned it was assumed they were not called to the incident. In most cases an outcome was provided.

There were concerns about the accuracy and the detail of the data reporting. Although the incident reports did provide some information about whether a ‘HO’ approach was taken (‘escorted, led, taken, timed out, placed in seclusion’) it was not clear whether the patients were placed in holds or restrained. There was very sporadic reporting on whether the response team was called to assist with the incident. Unless a specific outcome was mentioned, such as seclusion, the outcome was otherwise unclear, but this was not a frequent occurrence.

There was little reporting about injuries to the staff or patients during or as a result of the incidents. Where comments existed about injuries they were incongruous including, reports of staff being punched . . . no injuries sustained. This might be considered in the context of the widely used serious untoward incident categories: A = death, B = injury requiring hospitalization, C = injury not requiring hospitalization, D = moderate/minor injury, E = low/no harm. In this sample of 86 incidents all fell within the D and E categories implying only minor or no injuries. If we are to understand the full context of the severity of the incident information about minor injuries is important and it should be recorded accurately and consistently. Data detailing patient injuries, staff injuries and the duration of the restraint would also add to the picture when assessing the ‘quality’ and potential psychological impact of the restraint and de-escalation experience on the service users and for staff. A more sophisticated grading system of severity would improve the quality of the data. This current model dichotomizes the severity of the incident which creates an artificial line between severe and not severe. A more specifically graded system could be regressed across a continuous variable, improving the accuracy of the analysis. In future research it would be of use to adjust for the number of occupied beds on the assumption that a fully occupied unit would have a higher number of incidents.

Policy changes

The Trust under study produced guidelines for the use of RT which came out on April 2006, following a review of the NICE (2005) Clinical Guideline for Violence. This may also be a contributing factor to the non-significant reduction of RT in the post training group.

Staffing

In the post training group, the number of permanent staff per shift remained generally the same but the number of agency staff fluctuated. Having higher numbers of agency staff on the shift who are not trained in de-escalation and restraint could affect the outcome. The qualitative details of the incident reports suggested that staff reported that incidents that were handled without calling the response team were mainly dealt with by agency staff. This suggests that most de-escalation practice was therefore undertaken by staff who have not received the training.

Racial bias

‘The David Bennett Inquiry (2003)’ raised important concerns about the treatment of black service users within
the National Health Service and about the need to protect the airway during any physical interventions (NICE 2005). Although the potential for racial bias in the use of restraint has been discussed and found to be explained by the context of the situation taking into account other factors such as age, gender, diagnosis use of substances and ethnicity (Gudjonsson et al. 2000, 2004); the immediate response of staff to an incident as being proportionate to the situation requires further exploration. It is not clear whether ethnicity might play a part in this.

Cost

The cost of managing violence in inpatient units requires further analysis. As these data do not show a significant reduction in the severity of incidents, number of incidents, or use of RT, it is not clear whether the training is effective proportionate to the sizable amount of financial resourcing.

Although it was possible to roughly estimate the costs of the training in terms of staffing, it was not possible to derive enough accurate data to estimate the costs of the incidents on the unit. There is insufficiently recorded detail about damage to property, staff or service users and it was not possible to trace absence through injury to staff in the ward records. These data would be required in order to accurately calculate the cost impact of the training in relation to its benefits and should be recorded so that a cost analysis could be conducted.

In this current climate where National Health Service organizations need to have a detailed understanding of their cost base, there is an urgent requirement to present transparent and consistent details of how finances are being allocated (Department of Health 2007). Additional data is required to explore these issues and this should be addressed by future research.

Recommendations

In order that more useful findings can be accessed in the future, the following should be recorded:

1. Was the response team called?
2. Was the patients placed ‘in holds’ at any stage of the incident?
3. Was the patient restrained?
4. How long was the patient restrained for?
5. Were enhanced levels of observations employed?
6. Was the patient placed in a high dependency area?
7. Was the patient placed in seclusion?
8. Were there any injuries to staff?
9. Were there any injuries to patients?
10. What were the injuries – bruising, cuts, abrasions, etc.?
11. Were there staff absences due to injuries? For how long?

Limitations

This case study has limitations in that PICU is a specialist ward and not generalizable to other areas, and only one ward was included. Future research might consider accessing other clinical areas and extending to include more than one Trust.

Conclusion

The clinical effectiveness of physical intervention training requires further evaluation and more work is required to improve the accuracy and detail of data recording around incidents. This would help to address whether physical interventions are the right solution to aggressive behaviour in modern psychiatry. More research is required to address some of the methodological and ethical issues in evaluating this type of training. This work might address additional confounders than those indicated in this study such as the effects of agency staff, client ethnicity and bed occupancy and include a larger sample of different acute environments.

Declaration of interest

None.

References


Health and Safety Executive (1995) Regulations for the reporting of injuries, diseases and dangerous occurrences regulations.