


# BMJ Open Quality Promoting patient and nurse safety: testing a behavioural health intervention in a learning healthcare system: results of the Demeanor pragmatic, cluster, cross-over trial

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## ABSTRACT

**Background** Based on clinical staff safety within a learning healthcare system, the purpose of this study was to test an innovative model of care for addressing disruptive behaviour in hospitalised patients to determine whether it should be scaled up at the system level.

**Methods** The Disruptive bEhaviour manageMEnt AND prevention in hospitalised patients using a behaviOuRal (Demeanor) intervention team was a pragmatic, cluster, cross-over trial. A behavioural intervention team (BIT) with a psychiatric mental health advanced practice nurse and a social worker, with psychiatrist consultation, switched between units each month and occurrences of disruptive behaviours (eg, documented violence control measures, violence risk) compared. Nursing surveys assessed self-perceived efficacy and comfort managing disruptive patient behaviour.

**Results** A total of 3800 patients hospitalised on the two units met the criteria for inclusion. Of those, 1841 (48.4%) were exposed to the BIT intervention and 1959 (51.6%) were in the control group. A total of 11 132 individual behavioural issues associated with 203 patient encounters were documented. There were no differences in the use of behavioural interventions, violence risk or injurious behaviour or sitter use between patients exposed to BIT and those in the control group. Tracking these data did rely on nursing documentation of such events. Nurses (82 pre and 48 post) rated BIT as the most beneficial support they received to manage patients exhibiting disruptive, threatening or acting out behaviour.

**Conclusions** The BIT intervention was perceived as beneficial by nurses in preparing them to provide care for patients exhibiting disruptive, threatening or acting out behaviour, but documented patient behaviour was not observed to change.

**Trial registration number** NCT03777241.

## OVERVIEW

Workplace violence has become a priority safety concern in healthcare settings, as healthcare providers are now exposed to workplace violence more than any other profession.<sup>1 2</sup>

As a result, the need for using de-escalation techniques as a first-line response to potential violence and aggression has become more prevalent.<sup>3</sup> At our own academic medical centre, survey data identified that more than 50% of all discharges on two medical-surgical units during fiscal year 2017 had a behavioural health diagnosis, which was associated with a longer mean length of stay (6.6 days vs 5.31 days) and a higher cost per discharge when compared with those without a behavioural health diagnosis on the same units.<sup>4</sup> Based on a behavioural healthcare knowledge and skills assessment conduct among 623 of our staff nurses, 72% reported patients' behaviour impacted their ability to provide care, 58% reported situational anxiety in caring for these patients, and 44% feared for their personal safety as a result of patient disruptive behaviour.<sup>4</sup> Based on these data, our administration identified managing disruptive patient behaviour, that is, behaviour that could interfere with a healthcare provider's ability to provide safe, effective and efficient care to a patient,<sup>5</sup> as a top priority for the institution to ensure safety of patients, family members and clinical staff.

Studies of de-escalation strategies have identified positive consequences, including preventing violent behaviour, avoiding the use of restraints, reducing patient anger and frustration, maintaining the safety of staff and patients, enabling patients to manage their own emotions and to regain personal control, and helping patients to develop feelings of hope, security and self-acceptance.<sup>1 3 6-8</sup> Rather than immediate broad deployment of an intensive and expensive intervention, administration decided to first measure its effectiveness, and then to scale it up if the

### Box 1 Behavioural intervention team actions

1. Psychiatric consultation and recommendations for symptom management.
2. Behavioural plans of care for nurse/patient interaction.
3. Psychosocial support and brief psychotherapeutic intervention.
4. Curbside consultation for any member of the patient's healthcare team.
5. Patient advocacy and care coordination.
6. Psychiatric-specific disposition support, including both inpatient and outpatient psychiatric services.
7. Education and support to the patient care teams (nurses, physicians and others).
8. Assists non-psychiatric staff in the management of patients who require behavioural healthcare.

findings supported utility. Thus, the aim of this study was to evaluate the impact of a proactive behavioural team intervention combined with trauma informed care and de-escalation educational training of bedside clinical nurses in reducing disruptive behaviour.

## METHODS

A waiver of informed consent was requested and approved. Informed consent was required for the clinical staff completing the online surveys assessing their comfort with and confidence in their ability to manage patients exhibiting disruptive, threatening or acting out behaviour.

The Disruptive bEhaviour manageMEnt ANd prevention in hospitalised patients using a behaviOuRal intervention team (DEMEANOR) protocol was previously published in full.<sup>4</sup> Briefly, this was a pragmatic, cluster, cross-over trial conducted between March 2019 and December 2019 on two adult medical-surgical units. The study involved the collection of data to compare patients who were and were not exposed to a clinical care practice: the behavioural intervention team (BIT). Institutional leadership planned to deploy one team as a demonstration project, and to scale it if successful. This provided an opportunity for rigorous evaluation of the team's effectiveness. All adult (aged  $\geq 18$  years) patients admitted to either of the two units during the study period were eligible for the trial. To prevent contamination between study arms, patients were required to be both admitted to and discharged from the unit during the study month; patients present on a unit at the crossover when the BIT changed units were not included in the analysis.

The BIT consisted of a psychiatric mental health advanced practice nurse and a social worker, with psychiatrist consultation. The team proactively screened patients on admission to assess for behavioural health comorbidities and conducted a comprehensive psychiatric assessment with a focus on safety, cognitive assessment, medical comorbidity and current medications. The team proactively provided interventions aimed at mitigating behavioural risks through various patient-specific

interventions, including psychiatric consultation and recommendations for symptom management, behavioural plans of care for nurse/patient interaction and other psychosocial support interventions as outlined in [box 1](#). During a control month when the BIT is not present on a unit, the care and management of patients is not supported with proactive screening and management. Unit staff had access to all psychiatric or behavioural care routinely available.

All data for this study were obtained from the electronic health records (EHRs). Data included aggregate demographic data, documentation of patient disruptive behaviour and associated medication administration, and patient length of stay. In preparation for this study, new documentation fields were added to the EHR to enable description (and subsequent extraction) of disruptive patient behaviours including physical behaviours (hit, kick, slapped, shoved, spit at, thrown objects, grabbed, bitten or attacked), verbal behaviours (threatening, bullying, harassing, name calling, blaming, insulting, yelling, cursing, intimidation) and any clinical interventions that are implemented to control any violent behaviour. Nursing staff received additional training on documentation practices for behavioural problems and the use of discrete data elements.

Prior to deploying the BIT, staff nurses on the clinical units received educational in-service training on de-escalation techniques and trauma informed care. The nurses were also asked to complete anonymous surveys to measure their self-perceived ability to manage disruptive patient behaviour, as well as perceptions of workplace violence and safety. Surveys were administered using Research Electronic Data Capture.<sup>9</sup> The survey included a 10-item scale adapted from Loucks *et al*<sup>10</sup> and Rutledge *et al*<sup>11</sup> who validated the Behavioural Healthcare Competency Survey to measure perceived frequency and type of disruptive, threatening or acting out behaviour; fear for personal or patient safety; situational anxiety; comfort with implementing strategies for behaviour management and job satisfaction. The survey was evaluated for content validity for the current study purpose. The nurse surveys were distributed to all nursing staff on the units at three different time points: prior to the study, following the first 1-month intervention period when only one unit had experienced the BIT programme, and after the study period had been completed. In repeat surveys, opinions about the BIT programme were solicited.

There were two primary outcomes specified. First was the occurrence of violence control measures used or patient injurious behaviours reported, based on a composite of documented violence control nursing interventions, when necessary (pro re nata) PRN medication used for behaviour control or agitation, and documented nursing problem of violence risk or injurious behaviour. The second was nurse reported comfort and confidence in their ability to manage patients exhibiting disruptive, threatening or acting out behaviour. Secondary outcomes included patient length of stay, violence control

**Table 1** Patient characteristics

	N=3521	
	Median	IQR
Age	58.0	44.0–69.0
	n	%
Race	N=3515	
Black	603	17.2
White	2775	78.9
Other	108	3.1
Unknown	29	0.8
Ethnicity	N=3490	
Hispanic or Latino	108	3.1
Not Hispanic or Latino	3339	95.7
Not Reported	43	1.2
Gender	N=3521	
Female	1683	47.8
Male	1838	52.2

interventions, as-needed medication use, use of restraints and use of sitters/patient attendants.

Prior to the study, we determined 1790 patients would need to be included to achieve 80% power to detect a 5% reduction in the use of behavioural interventions from the current 17.5% event rate. The calculation used the method of Arnup *et al*<sup>12</sup> to take into account the ICC, number of clusters, and number of cross-overs, we estimated 10 months of data collection would be needed.

### Patient and public involvement

Patients were not directly involved in the study but a public member serves on the Learning Healthcare System Committee which reviewed and approved the study.

### Data analysis

Descriptive statistics were used to summarise the data using median and IQR for continuous variables and frequency and percentages for categorical variables. Univariate comparisons used  $\chi^2$  tests for categorical variables and a Wilcoxon rank-sum test for ordinal or

continuous variables. The primary analysis of the effects of the intervention compared outcomes between patients exposed to the BIT and those patients not exposed to the BIT, adjusted for patient age, sex, race, comorbidities, reason for admission and psychiatric diagnoses. For binary outcomes, a logistic mixed effects model was used with unit and period as random effects. A proportional odds model was used for ordinal and continuous outcomes. A generalised estimating equation approach was also applied to estimate the marginal intervention effects. Because surveys were anonymous and staffing changed over the course of the study period, survey results were compared between periods without consideration of repeated responses from the same participants. Nurse survey results were compared using Pearson and Kruskal-Wallis tests.

### RESULTS

A total of 3800 patients hospitalised on the two units met the criteria for inclusion. Of those, 1841 (48.4%) were exposed to the BIT intervention and 1959 (51.6%) were in the control group. Patients were predominantly White (79%) with a mean age of 58 (SD 56.5±16.9, table 1). A total of 11 132 behavioural issues were documented (eg, documented violence control measures, violence risk) associated with 203 unique encounters. These encounters involved violence risk (20.7%), physical or verbal threats (19.4%), attacking objects (19.4%), injurious behaviour (5%) and the need for restraints (7%).

Overall, there was a 6% rate of behavioural interventions including use of PRN medications (4.1%), use of sitters (3.4%) or restraints (0.1%) (table 2). There were no differences in the documented use of behavioural interventions, violence risk or injurious behaviour, use of a sitter, use of as-needed medications to control behaviour, or length of hospital stay between patients exposed to BIT and those in the control group (5.9% vs 5.8%; p=0.89).

A total of 82 nurses completed the pre-implementation survey, 48 completed the 1-month implementation survey, and 48 completed the postimplementation survey. Nurse perceptions of BIT were very positive, with 48% identifying it as the most beneficial training/support they

**Table 2** Endpoints

	Non-intervention group		Intervention group		P value
	N=1959		N=1841		
Sample size	Median	IQR	Median	IQR	
Endpoints					
Patient length of stay	3.00	3.92±3.28	3.00	4.00±3.34	0.501
	Frequency	%	Frequency	%	P value
Use of violence control intervention	19	1	19	1	0.8474
Use of PRN medication	80	4.1	77	4.2	0.8785
Violent risk or injurious behaviour	57	2.9	63	3.4	0.3667
Use of sitter	63	3.2	68	3.7	0.4199

**Table 3** Nursing survey results

	Pre intervention (N=82)	One* month (N=48)	Post intervention (N=48)	
	n (%)	n (%)	n (%)	P value
	N=78	N=45	N=45	
Encountered patients disruptive/threatening behaviour	74 (95)	35 (78)	41 (91)	0.012†
	N=82	N=48	N=48	
Experience physical abuse	47 (57)	8 (17)	16 (33)	<0.001†
Witness central line manipulation	11 (13)	6 (12)	20 (42)	<0.001†
Witness suicidal ideation	44 (54)	8 (17)	19 (40)	<0.001†
Experience situational anxiety	N=73	N=35	N=41	0.022†
Never	4 (5)	1 (3)	2 (5)	
Rarely	13 (18)	16 (46)	8 (20)	
Sometimes	26 (36)	8 (23)	21 (51)	
Often	29 (40)	8 (23)	9 (22)	
Always	1 (1)	2 (6)	1 (2)	
De-escalation and trauma care beneficial?	N=67		N=32	<0.001†
Least beneficial	4 (6)		4 (12)	
Less beneficial	20 (30)		11 (34)	
Neutral	0 (0)		11 (34)	
More beneficial	23 (34)		4 (12)	
Most beneficial	20 (30)		2 (6)	
Unit based education beneficial?	N=67		N=39	<0.001†
Least beneficial	7 (10)		0 (0)	
Less beneficial	23 (34)		9 (23)	
Neutral	0 (0)		14 (36)	
More beneficial	19 (28)		9 (23)	
Most beneficial	18 (27)		7 (18)	
Psychiatric consult service beneficial?	N=68		N=34	<0.001†
Least beneficial	15 (22)		4 (12)	
Less beneficial	14 (21)		7 (21)	
Neutral	0 (0)		8 (24)	
More beneficial	15 (22)		9 (26)	
Most beneficial	24 (35)		6 (18)	
Behavioural health and safety modules beneficial?	N=61		N=37	0.24†
Beneficial	18 (30)		7 (19)	
Non-beneficial	43 (70)		30 (81)	
De-escalation and trauma care beneficial?	N=67		N=32	<0.001†
Beneficial	43 (64)		6 (19)	
Non-beneficial	24 (36)		26 (81)	
	<b>Median (IQR)</b>	<b>Median (IQR)</b>	<b>Median (IQR)</b>	
Experience Composite Score	10.0 (7–12)	7.0 (0–10)	8.5 (6–11)	0.004†
Confidence in caring for patients	7.0 (5–8)	7.0 (5–8)	7.0 (6–8)	0.39‡
How satisfied with career choice	27 (13–52)	34 (20–39)	26 (12–38)	0.75‡

\*The 1-month time period reflects the first 1-month intervention period when only one unit had experienced the BIT programme; only perceptions of the frequency of encountering disruptive patient behaviour were collected at this time interval.

†Pearson test.

‡Kruskal-Wallis test.

BIT, behavioural intervention team.

received to manage patients exhibiting disruptive, threatening or acting out behaviour. Nurses also perceived the psychiatric consult service and behavioural management

and de-escalation and trauma informed care training to be beneficial, with 69% identifying the training as most beneficial at the post intervention period. Nurses also

reported a decrease in situational anxiety in managing patients, and they perceived less reports of physical abuse preintervention to postintervention (table 3).

## DISCUSSION

Overall, the Demeanor trial did not provide evidence for effectiveness of the BIT intervention in reducing documented disruptive behaviours. However, it did result in perceived improvement in the ability of nurses to provide care for patients exhibiting disruptive, threatening, or acting out behaviour. Nurses also perceived less physical abuse and a decrease in situation anxiety in managing disruptive patients. These findings are interesting and important in light of the continued emphasis on promoting a safe work environment for nurses and decreasing workplace violence.<sup>13 14</sup>

Similar to prior studies which identified the benefit of de-escalation training,<sup>12 15–18</sup> the current study found that education on de-escalation and trauma-informed care, along with a support from a BIT was beneficial to the nursing staff, as nurses experienced less anxiety in caring for these patients, based on the survey item responses. We note that while de-escalation techniques have been shown to be effective in managing violent incidents, most studies on patient aggression have been conducted in psychiatric, specialty or emergency room settings.<sup>1</sup> Several studies have explored interventions for managing patient aggression in hospital settings, and the evidence strongly supports de-escalation as the first-line intervention to reduce patient aggression directed toward healthcare providers.<sup>2 15 16</sup> The use of a proactive BIT similar to the one we deployed has also been demonstrated to be beneficial in decreasing length of stay and use of companion sitters.<sup>19–22</sup> Our pragmatic trial, designed to measure the effectiveness of the BIT in day-to-day practice, did not replicate these findings. Additional research on strategies for managing disruptive patient behaviour in healthcare settings to promote patient and staff safety is needed. Future studies evaluating the use of de-escalation and trauma-informed care in combination with a supportive BIT may identify additional benefits in promoting staff and patient safety. As advocated by the Joint Commission,<sup>3</sup> measures to mitigate potential violence and aggression in healthcare settings and promote safety remain priority areas of focus.

This trial highlights the value of testing administrative initiatives aimed at improving patient care. As a direct consequence of our findings, what was initially expected to be scaled up to a hospital-wide initiative has been redesigned to build on its strengths. Based on the findings that nurses perceived less physical abuse and a decrease in situation anxiety in managing disruptive patients, and consistent with the institution's continued emphasis on promoting a safe work environment for nurses and decreasing workplace violence, the BIT continues to provide consultation on selected clinical units with patients who have a higher number of psychiatric comorbidities.

This has also enabled ongoing education and supporting nurses' ability to manage disruptive behaviour.

Our findings should be interpreted in the context of several limitations. Outcomes, including incidences of disruptive patient behaviour, were collected from the EHR, therefore the results may be limited by the accuracy and completeness of documentation. Reflective of the realities of clinical care, nurses may not have always fully documented or had time in some instances to fully capture patient disruptive behaviour in their charting. There were fluctuations in patient census during the trial, which might have affected the amount of intervention when census was high. Additionally, the study was a single-centre study design using two clinical units. Response rates to the nurse survey were lower at 1 month and post-implementation when compared with baseline, and the anonymous approach to data collection did not allow for matching responses over time. Additionally, the initial RN education on trauma informed care and de-escalation techniques and the new documentation may have impacted the results. Including patient involvement in refining activities in the use of de-escalation and trauma-informed care would be beneficial for future studies.

## CONCLUSIONS

The use of an innovative model of care using a psychiatric mental health advanced practice nurse and social worker dyad with psychiatrist consultation to proactively screen and address disruptive behaviour in hospitalised patients was beneficial in improving nurses' perceived ability to manage patients exhibiting disruptive, threatening or acting out behaviour, but there was no evidence of an effect on documented disruptive patient behaviour. As addressing workplace violence has become a priority area in nursing, the use of proactive measures including trauma informed care and de-escalation training can be beneficial in enhancing the ability of nurses to address patients with disruptive behaviour. This study highlights the importance of rigorous evaluation of new programmes as they are implemented in healthcare systems as efficacy does not always translate to effectiveness.

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are appropriately investigated, resolved, and the resolution documented in the literature. RK is Guarantor.

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**Patient consent for publication** Not applicable.

**Ethics approval** The study was approved by the Vanderbilt University Institutional Review Board (IRB #182229). The study was presented to the IRB as posing minimal risk to patient participants because the proactive screen was being conducted as part of clinical care to enhance patient care.

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**Data availability statement** Data are available on reasonable request.

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