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 (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 a psychologist 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.¹ ² As a result, the need for using de-escalation techniques as a first-line response to potential violence and aggression has become more prevalent.³ 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.⁴ 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.⁴ 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,⁵ 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.¹ ³ ⁶–⁸ 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
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 ability to manage patients exhibiting disruptive, threatening or acting out behaviour.

The Disruptive bEhaviour manageMEnt ANd preven- tion in hospitalised patients using a behaviouRal inter- vention team (DEMEANOR) protocol was previously published in full. 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 ≥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. The survey included a 10-item scale adapted from Loucks et al and Rutledge et al who validated the Behavioural Healthcare Competency Survey to measure perceived frequency and type of disruptive, threatening or acting out behaviour; 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
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. 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 11132 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
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

| Table 3  | Nursing survey results                                                                 |
|----------|----------------------------------------------------------------------------------------|
|          | Pre intervention (N=82) | One month (N=48) | Post intervention (N=48) | N=78 | N=45 | N=45 | P value |
| Encountered patients disruptive/threatening behaviour | 74 (95) | 35 (78) | 41 (91) | 0.012† |
| 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) | |
| Experience Composite Score | Median (IQR) | 10.0 (7–12) | 7.0 (6–10) | 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.
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.13 14

Similar to prior studies which identified the benefit of de-escalation training,12 15–18 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.1 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.2 15 16 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.19–22 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,3 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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