

ORIGINAL RESEARCH

Behavioural assessment unit improves outcomes for patients with complex psychosocial needs

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Abstract

Objective: We aimed to assess the impact of a new model of care for patients presenting to the ED with acute behavioural disturbance.

Methods: This pre-/post-intervention study involved creating a dedicated, highly resourced six bed unit, the behavioural assessment unit (BAU). Co-located with the ED at the Royal Melbourne Hospital, the unit was designed to fast-track the admission of patients affected by intoxication, mental illness or psychosocial crisis and provide front-loaded interventions.

Results: In 12 months from 1 April 2016, 2379 patients were admitted to the BAU. They were compared with a similar cohort of 3047 patients from the entire 2015 ED population. The BAU resulted in a decreased wait to be seen (40 min [interquartile range (IQR): 17–86] vs 68 min [IQR: 24–130], $P < 0.001$), a decreased wait for a mental health review (117 min [IQR: 49–224] vs 139 min [IQR: 57–262], $P = 0.001$) and a decreased ED length of stay (180 min [IQR: 101–237] vs 328 min [IQR: 227–534], $P < 0.001$). Patients admitted to the BAU were less likely to have a security code (349 (14.7%) vs 538 (17.7%), $P = 0.003$) and less

likely to have mechanical restraint (156 episodes (6.6%) vs 275 (9.0%), $P < 0.001$) or therapeutic sedation (156 episodes (6.6%) vs 250 (8.2%), $P < 0.001$).

Conclusion: A unit specifically designed to improve the care of patients requiring prolonged ED care due to mental illness and/or intoxication reduces the time spent in the ED and the use of some restrictive interventions. We recommend this model of care to EDs that care for this complex and challenging group of patients.

Key words: *behavioural emergency, emergency psychiatry, patient flow, restrictive interventions.*

Introduction

Acute behavioural disturbance is a medical emergency. It is an increasingly common clinical problem facing health services and EDs,¹ and poses a significant direct risk to patient safety as well as to the welfare of staff, the public and hospital property.² Patients with acute behavioural disturbance are not a homogenous cohort. Previous studies into the causes of acute behavioural disturbance have demonstrated a relationship to drug and

Key findings

A purpose built unit designed for the management of behavioural emergencies:

- improves patient flow though the emergency department;
- decreases restrictive interventions; and
- is financially sustainable.

alcohol misuse, drug-induced psychosis, exacerbation of a pre-existing mental health diagnosis or an underlying organic illness.^{3,4} A primary mental health illness (including psychosis) accounts for only 15%.⁵

In the acute setting, the cause of an acute behavioural disturbance may be hard to differentiate and the initial management of this patient group requires the use of de-escalation strategies, an appropriate environment, highly trained staff and adequate clinical resources to protect the safety and dignity of all concerned.⁶

Care of acute behavioural disturbance in the ED is particularly challenging, often requiring more resources and specialised care than other patient groups.⁷ A study of the mental health population within EDs, a substantive proportion of those patients with acute behavioural disturbance, shows that this patient group have been observed to have a disproportionately extended ED length of stay with significant variation in their management.⁸

In Australia, there have been calls to improve the management of this population, including within the ED.⁹ Barriers to providing optimal care to this patient group include

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environmental factors, such as limited appropriate physical space, concern for safety and security and access to mental health services, as well as patient factors, such as aggression, intoxication and difficulties differentiating between mental health issues and social disorganisation.¹⁰ There is a clear need to address these barriers and revise the care provided to this vulnerable population.

In mid-2015, following the Travis report,¹¹ Melbourne Health received funding from the Victorian Department of Health to establish a behavioural assessment unit (BAU), comprising six behavioural assessment beds. The newly established area is managed by, and co-located with, the ED. The BAU model of care aims to create a safe and therapeutic environment for behaviourally disturbed patients of any aetiology, including patients with acute and chronic substance abuse; patients in psychosocial crisis; patients with acute psychiatric conditions; and patients recovering from acute toxidromes secondary to a drug overdose not at risk of requiring intubation.

The philosophy of the unit is to fast-track the assessment and management of behaviourally disturbed patients presenting to the ED in an environment that has been specifically designed to be safe and secure, allow close observation and provide timely access to specialist expertise and facilities for the appropriate use of sedation and restraint when required, irrespective of the patient's primary diagnosis. At the inception of the project we believed that the need for early intervention was common across each patient cohort, and once a therapeutic environment was created, directed management of the underlying clinical problem could then be safely addressed.

This study aims to assess the impact of the introduction of the BAU on patient outcomes, process and quality of care.

Methods

Site and setting

The Royal Melbourne Hospital is a tertiary centre on the edge of the

central business district. There are 72 000 ED presentations per annum with approximately 45% being admitted. The ED has access to emergency mental health (EMH) clinicians 24 h a day, a dedicated drug and alcohol clinician 3 days a week and an on-call toxicology specialist 24 h a day. There is a 20 bed short-stay observation unit designed for patients who will remain under the exclusive care of emergency medicine for up to 24 h.

This study is an evaluation of the impact on patients with an acute behavioural disturbance following the commissioning of the BAU. The BAU is a discrete six bed unit designed to improve privacy and decrease stimulation. It provides specialised care to all patients with acute behavioural disturbance, specifically behaviour influenced by drugs and alcohol, drug intoxication, mental illness and social crisis. In the majority of cases, a combination of these acute or chronic triggers will be present. The unit is not a psychiatric emergency care centre (PECC) as described under the Australasian Health Facilities Guidelines of the Australasian Health Infrastructure Alliance.¹² PECCs are specifically designed for people presenting to the ED with acute mental health illness who may have a length of stay up to 72 h. They are closed wards devoid of ligature points and have lockable single bedrooms. Our unit is open; it has four cubicles and two single rooms that are not locked. The two cubicles nearest to, and opposite, the nurses' station are used for patients who have taken overdoses or need close observation and monitoring following sedation. An interview room with a second point of egress is in the unit. A medication preparation area is immediately adjacent and accessed through swipe card. Both fixed and personal duress alarms systems are installed and the area is monitored remotely by our security staff (located 50 m away) on closed-circuit television.

EMH and drug and alcohol clinicians are co-located to improve access to early intervention. There are between two and three nurses in the unit at all times, providing a high nurse/patient ratio. A psychiatrist

and/or psychiatry registrar are located in the unit each morning. The unit was designed to admit patients with an acute behavioural disturbance, with an expected discharge to home within 24 h. The budget for the unit included a 'one off' \$500 000 payment for capital works to refurbish the area (previously used as a rapid assessment ward for general medicine patients) and recurrent costs to provide additional staffing; an additional EMH clinician in the evening, one half-time consultant psychiatrist position and one half-time psychiatric registrar position to cover morning ward rounds. The nursing workforce increased in line with workforce agreements to cover the additional six beds. An additional resident was provided overnight to support the 20 bed short-stay unit, as well as the BAU. As the BAU was gazetted as an inpatient area, cost recovery was budgeted on the Weighted Inlier Equivalent Separation (WIES) generated by the unit (WIES is the Victorian unit of activity-based funding). While not an outcome of this study the first 12 months, the revenue generated was able to cover the costs and deliver a small surplus. Admission criteria included a restricted age range of 16–65 years who are not deemed to be at risk of requiring intubation for airway support. For all admission criteria, clinical discretion is acceptable.

Design

We conducted a pre-/post-intervention study based around the establishment of the BAU. The unit was opened progressively from early 2016. The post-BAU cohort in this study was assessed from 1 April 2016 when the unit became fully operational; 12 months of data was obtained. The pre-BAU cohort was taken from all 2015 ED presentations.

Outcomes

The BAU was designed to move patients from the ED to a dedicated, well-resourced, low-stimulus environment. The primary outcome was length of stay in the ED.

The following secondary outcomes were also assessed:

- time to ED clinician;
- time to EMH clinician;
- Code Grey rates; and
- restrictive intervention rates.

A Code Grey is the institution's security alert for an unarmed threat.¹³ Restrictive interventions included the need for physical and mechanical restraint and therapeutic sedation.

Study entrance criteria

The post-BAU data included all patients admitted to BAU from 1 April 2016 to 31 March 2017. Patients who had a medical diagnosis (renal colic, gastroenteritis, and so on) were considered as short-stay unit patients and therefore excluded. The short-stay unit is a geographically separate 20 bed unit not designed for the BAU population, but at times of access block, short-stay patients may be temporarily admitted to the BAU as boarders.

To establish a comparable pre-BAU population, all ED presentations from 2015 were included if their length of stay was between 3 and 24 h, their discharge destination was ultimately home or discharging against medical advice and the patient age was over 16 years of age. Patients were also included only if their final discharge diagnosis was coded as a mental health issue, psychosocial crisis or related to intoxication.

For each time period, data were extracted from the ED information system¹⁴ and the security Code Grey database and merged into a single Microsoft Excel worksheet (97–2003; Microsoft, Redmond, WA, USA).

Sample size and analysis

No a priori sample size was calculated, but it was predicted in the BAU business case that approximately 3000 patients with drug-related, mental health and other self-harm presentations would be admitted to the BAU per annum. It was

expected that this would be of sufficient size to identify clinically important changes to patient care.

Patient characteristics in the two cohorts are presented descriptively. Proportions were compared using χ^2 tests, parametric variables were examined with *t* test or ANOVA and non-parametric variables using the Mann–Whitney or Kruskal–Wallis test as appropriate.

Data was transferred to STATA for analysis.¹⁵

Consistent with previous studies, and the large number of variables to be investigated, a significance level of 0.01 was set.

The study was approved by the Melbourne Health Human Research and Ethics Committee and performed in accordance with the ethical standards laid down in the Declaration of Helsinki.

Results

In 2015, there were 67 311 ED presentations and the median length of stay was 208 min (interquartile range [IQR]: 127–330). The median waiting time to see a doctor was 47 min (IQR: 18–94). Of these, 3047 were selected as the pre-BAU cohort. Between 1 April 2016 and 31 March 2017, there were 72 839 ED presentations and the median length of stay was 203 min (IQR: 123–314). The median waiting time to see a doctor was 51 min (IQR: 20–99). Of these, 3259 were admitted into the BAU. A total of 880 patients had medical diagnoses and were excluded from the analysis, leaving 2379 patients in the post-BAU cohort.

Table 1 shows the demographics of the two groups. There are no clinically important differences between the two groups.

Figure 1 shows the ED length of stay was decreased in the pre-BAU cohort from 328 min (IQR: 227–534) to 180 min in the post-BAU cohort (IQR: 101–237), $P < 0.001$.

Figure 2 shows the median waiting time to be seen reduced from 68 min (IQR: 24–130) to 40 min (IQR: 17–86), $P < 0.001$.

Similarly, Figure 3 shows the median time to see an EMH clinician

reduced once the BAU was operational, from 139 min (IQR: 57–262) to 117 min (IQR: 49–224), $P = 0.001$.

Table 2 shows the total number of Code Greys called for each population and the proportion of restrictive interventions. In the pre-BAU cohort, 370 patients had 538 Code Greys called while in the ED. The post-BAU cohort had 259 patients having 349 codes while in the ED or in the BAU. There was a small reduction in the rate of patients having mechanical restraint or therapeutic sedation but no overall change in the rate of restrictive interventions.

The pre-BAU cohort had a mean ED length of stay of 423 min, with a standard deviation of 265 min. The post-BAU cohort had a mean ED length of stay of 210 min, with a standard deviation of 179. Setting significance (alpha error) at 0.01 and power (1-beta error) at 0.90, a post hoc analysis indicates 34 patients would be required in each sample. For the numbers in this study, the power to find the effect size seen is 1.0000.

Discussion

The BAU was designed to move a vulnerable population out of the ED into an environment designed to provide less stimulus, better access to the expert care and decrease the need for restrictive interventions.

When compared to a historical control, selected based on ED diagnosis, the total ED length of stay for patients admitted to BAU was significantly less than that observed among the historical controls. We observed fewer Code Grey events and episodes of mechanical restraint and therapeutic sedation. Although the rate of reduction was small, the opportunity to reduce the restrictive intervention rate is important.

Since the introduction of the National Emergency Access Targets, Australian hospitals have been progressively improving the throughput of patients, within 4 h, closing on the 90% target.¹⁶ Certain patient populations have been challenging when it comes to meeting National Emergency Access Targets. These include patients with mental health issues and

TABLE 1. Comparison of the pre-behavioural assessment unit (BAU) and post-BAU populations

Variable	Pre-BAU (n = 3047)	Post-BAU (n = 2379)	P-value
Age, median (IQR) (years)	34 (25–46)	33 (24–46)	0.042
Male, n (%)	1729 (56.7)	1282 (53.9)	0.036
ATS†, n (%)			
1	80 (2.6)	86 (3.6)	<0.001
2	257 (8.4)	254 (10.7)	
3	1792 (58.8)	1430 (60.1)	
4	837 (27.5)	573 (24.1)	
5	81 (2.7)	36 (1.5)	
Arrival mode, n (%)			
Ambulance	1705 (60.0)	1465 (61.6)	<0.001
Police	269 (8.8)	144 (6.1)	
Top diagnoses, n (%)			
Alcohol related	497 (16.3)	377 (15.8)	<0.001
Self-harm	308 (10.1)	273 (11.5)	
Hostility	256 (8.4)	185 (7.8)	
Depression	225 (7.4)	168 (7.1)	
Transient psychosis	217 (7.1)	76 (3.2)	
Anxiety	198 (6.5)	50 (2.1)	
Schizophrenia	130 (4.3)	92 (3.9)	
Stimulant related	113 (3.7)	89 (3.7)	
Other toxicology	421 (13.8)	465 (19.5)	
Other diagnoses	682 (22.4)	604 (25.4)	

†1, to be seen immediately; 2, within 10 min; 3, within 30 min; 4, within 60 min; 5, within 120 min. ATS, Australasian Triage Scale; IQR, interquartile range.

those who are intoxicated. Mental health, in particular, requires a prolonged initial assessment and corroboration to ensure either safe discharge home or appropriate admission to a psychiatric ward. Typically access to these services is highly constrained.⁷ Intoxicated patients are mostly expected to be discharged when they recover from their toxidrome. The combination of intoxication and mental health crisis is particularly challenging. Our study has demonstrated that a dedicated, purposefully built unit improves the time to be seen and the time to a mental health clinician and substantially decreases the time spent in the ED.

The Department of Health and Human Services in Victoria is seeking to reduce the rate of restrictive interventions,¹⁷ the Victorian Mental Health Act mandates least restrictive care¹⁸ and ED medical and nursing staff seek to provide the best care while ensuring patient safety. The BAU resulted in less Code Greys and a reduction in mechanical restraint and therapeutic sedation. Although the size of this impact is small, any reduction is important to the patients involved and the staff that care for them. It is not clear which aspect of the intervention led to this benefit but better access to nursing staff, EMH and drug and alcohol services,

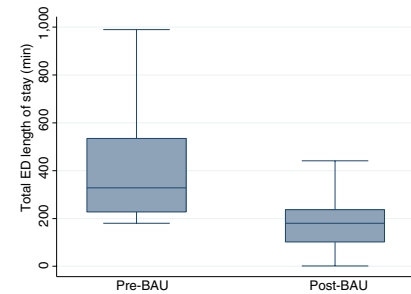


Figure 1. Total length of stay in the ED (min). Box shows median and interquartile range; whiskers represent values up to $1.5 \times$ the interquartile range outside the interquartile range. Outside values have been suppressed. BAU, behavioural assessment unit.

together with the low-stimulus environment would all be expected to be advantageous. Further exploration of this would be better done with a qualitative study.

In our study, only 13% of patients were identified as having a primary mental health problem (excluding self-harm and hostility). While this figure is consistent with other studies⁵ and supports the supposition that BAUs are different from PECCs, the proportion is probably greater given that 25% of diagnoses were coded as ‘other’. Thirty-five per cent of patients were reported to have a primary toxicology-related diagnosis, supporting the need to staff the unit with nurses highly skilled in advanced cardiac life support.

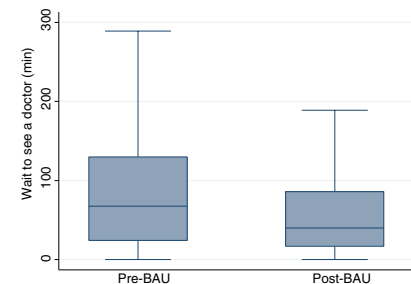


Figure 2. Waiting time to see a doctor (min). Box shows median and interquartile range; whiskers represent values up to $1.5 \times$ the interquartile range outside the interquartile range. Outside values have been suppressed. BAU, behavioural assessment unit.

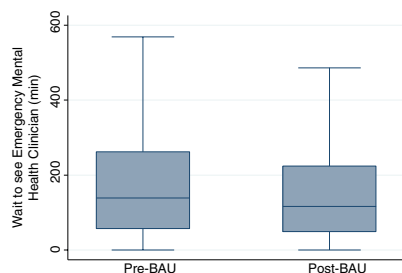


Figure 3. Time to see a mental health clinician in the ED. Box shows median and interquartile range; whiskers represent values up to $1.5 \times$ the interquartile range. Outside values have been suppressed. BAU, behavioural assessment unit.

Limitations

The study was undertaken at a single site with a particular patient population. The results may not be applicable to other sites.

The pre-BAU population was chosen prior to the commencement of the study. The aim was to identify from the entire 2015 patient population, those patients who would have gone to a BAU if it had been available. However, it is challenging to exactly select the same patient groups. ED discharge coding allows only a single diagnosis and it is possible that patients with intoxication and a minor head injury would have been admitted to BAU in 2015. If coded as a minor injury only, they

would not be included in the pre-BAU cohort. It is possible such a patient would be admitted to short-stay unit but they may have had their entire stay in the ED. It is unclear how the inclusion or exclusion of small patient subgroups would affect the results.

It should be noted that Table 1 identifies statistical differences in the two populations but clinically they are very similar. The top four diagnostic categories have a near identical distribution. There is a difference in acuity but it is clinically unlikely to be of importance (e.g. a change in Australasian Triage Scale category 3 of 1.3%).

As the two populations compared were in different years, it is difficult to determine the impact other ED strategies to improve patient care may have had on the results. While it is not feasible to randomise patients to this intervention in a single site, it would be possible to evaluate using a cluster randomised clinical trial across many sites.

It is also possible that the improved outcomes were related to the additional staffing provided for the BAU. As the BAU intervention includes the model of care, the environment and the staff to support the model, the intervention should be considered as a whole. The additional staff within the BAU are a necessary component of the successful intervention.

Conclusion

A unit specifically designed to improve the care of patients requiring prolonged ED care due to mental illness and/or intoxication reduces the time spent in the ED and the use of some restrictive interventions. As a consequence of the type of patient admitted to the BAU, we recommend that they are managed by advanced cardiac life support trained nurses and have access to a multidisciplinary team that can address their mental health issues, substance use issues and significant psychosocial needs. We recommend this model of care to EDs that care for this complex and challenging group of patients.

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Author contributions

All authors were involved in the design of the study and preparation of the manuscript. GB, SH, SP and MT were principally involved in the design of the BAU. JK undertook the data analysis.

Competing interests

GB is a section editor for *Emergency Medicine Australasia*.

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TABLE 2. Comparison of Code Grey rates and restrictive intervention rates

Variable	Pre-BAU (n = 3047)	Post-BAU (n = 2379)	P-value
Patients who had at least one Code Grey called, n (%)	370 (12.1)	259 (10.9)	0.159
Code Grey, n (%)	538 (17.7)	349 (14.7)	0.003
Restrictive intervention, n (%)			
Any intervention†	388 (12.7)	255 (10.7)	0.025
Physical restraint	339 (11.3)	224 (9.4)	0.043
Mechanical restraint	275 (9.0)	156 (6.6)	<0.001
Therapeutic sedation	250 (8.2)	156 (6.6)	<0.001

†Includes any combination of physical or mechanical restraint or therapeutic sedation. BAU, behavioural assessment unit.

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