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TITLE

Identifying predictors for clinical deterioration of mental state in patients assessed by telephone-based mental health triage.

ABSTRACT

Patient safety research focusing on recognising and responding to clinical deterioration is gaining momentum in generalist health, but has received little attention in mental health settings. The focus on early identification and prompt intervention for clinical deterioration enshrined in patient safety research is equally relevant to mental health, especially in triage and crisis care contexts, yet the knowledge gap in this area is substantial. This article reports on a controlled cohort study (n=817) that aimed to identify patient and service characteristics associated with clinical deterioration of mental state indicated by unplanned admission to an Inpatient Psychiatric Unit following assessment by telephone-based mental health triage. The main objective of the research was to produce knowledge to improve understandings of mental deterioration that can be used to inform early detection, intervention and prevention strategies at the point of triage. The study found that the clinical profile of admitted patients was one of complexity and severity. Admitted patients were more likely to have had complex psychiatric histories with multiple psychiatric admissions, severe psychotic symptoms, a history of treatment non-adherence, and poorer social functioning than non-admitted patients.

KEYWORDS

Patient Safety, Mental Health, Clinical Deterioration, Triage

INTRODUCTION

Patient safety research in mental health is of increasing importance in the context of the global challenge of mental health (Kleinman 2009; Patel & Prince 2010). There is thus an urgent need to improve the quality and safety of mental health care (Australian Commission on Safety and Quality in Health Care, 2014; Brickell & McLean 2011; Craze et al. 2014; NHS National Patient Safety Agency 2006). A particular focus of patient safety research is recognising and responding to clinical deterioration (Australian Commission on Safety and Quality in Healthcare, 2010). The central construct of this research is that early identification of clinical deterioration and prompt intervention can reduce the occurrence of high mortality and adverse events; and prevent the need for more complex and costly interventions (Craze et al. 2014; Preston & Flynn 2010). The concept of recognising and responding to clinical deterioration is widespread across many branches of medicine, yet there is a paucity of published research specifically targeting *recognition* of clinical deterioration of mental state (Australian Commission on Safety and Quality in Health Care, 2014).

This article reports the findings of a retrospective controlled cohort study that aimed to identify patient and health service characteristics associated with admission to an acute Inpatient Psychiatric Unit (IPU) in community-based patients assessed by telephone-based mental health triage services. The overall goal of the study was to produce findings to inform the development of objective clinical criteria to aid clinical decision-making in identifying patients at high risk of deterioration of mental state and admission to IPU.

Background

Research on clinical deterioration of mental state is limited to studies investigating signs, symptoms, risk factors and predictors of relapse or hospitalization within specific psychiatric conditions such as schizophrenia (Ascher-Svanum 2010;

Nicholl et al. 2010; Olfson 2011) mood disorders (Antypa et al 2013; Hendin et al. 2007; Oquendo et al. 2006; Perlis et al. 2006) and cognitive disorders (Damoiseaux et al. 2012; Han et al. 2009; Pernecky et al. 2006; Young et al. 2010). Other related research includes studies investigating predictors for psychiatric hospitalisation subsequent to admission to Psychiatric Emergency Services (Tossone et al. 2014; Unick et al. 2011) or the emergency department (Dazzi et al. 2015). No previous studies were identified that compiled a profile of clinical deterioration of mental state from community-based patients who were assessed by telephone-based mental health triage services. This knowledge gap is significant because in the current arrangement of Australian mental health services, public access to assessment and treatment is coordinated through telephone-based mental health triage services (Victorian Department of Health and Human Services 2010), which serve a diverse and complex patient population (Elsom et al. 2013; Sands et al. 2013b).

The importance of telephone-based mental health triage (TMHT) is in its pivotal role as a frontline public mental health service, operating 24 hours a day Australia-wide to provide assessment, support, advice and referral for people of all ages experiencing mental health problems (Sands et al. 2013a). Unlike emergency department (ED) triage where the patient is present in the ED and assessed face-to-face (Gerdtz et al. 2007), in TMHT the patient population is mostly community-based, and triage assessments are undertaken via the telephone (Sands et al. 2013b). The majority of all specialist mental health care in Australia is currently provided in community settings (Light et al. 2012), yet patient safety in community mental health is poorly understood and there an identified need to address this knowledge gap (Brickell and McLean 2015).

A key priority area of the current Australian National Mental Health Plan is preventing or intervening early in the onset or recurrence of mental illness (Commonwealth of Australia 2009). Relapse of major mental illness is identified in the literature as correlated with significant economic burden and poorer patient outcomes (Hong et al. 2009; Nicholl et al. 2010). Recent research suggests that relapse of major mental disorders can cause progressive functional deterioration in patients, which results in increased disability and vulnerability for future relapse (Ascher-Svanum et al. 2010; Hong et al. 2009; Olfson et al. 2011). While relapse is common in most mental disorders, efforts that focus on measures to reduce the risk of

relapse and promote recovery are aligned with better clinical and economic outcomes (Álvarez-Jiménez et al 2011; Killackey & Yung 2007).

Contemporary mental health policy and legislation (Parliament of Victoria 2014; Parliament of Scotland 2003) focuses on provision of psychiatric treatment in the 'least restrictive environment', optimally in the community, and within this lens, involuntary admission to an IPU is a last resort measure to prevent further deterioration of the patient's condition, or to protect the patient and/or members of the general public from harm (Parliament of Victoria 2014). In this context, unplanned or emergency psychiatric admission may be viewed as a failure to detect clinical deterioration early enough to intervene and prevent hospitalisation.

The Australian Commission on Safety and Quality in Health Care (2014) (ACSQHC) identifies a need for research to develop and validate instruments, tools and strategies specifically focused on recognising and responding to deterioration in mental state, and on managing the associated risks and potential adverse outcomes. The ACSQHC notes that commonly used assessment tools and instruments have a range of different purposes, and while change in routine outcome measures can be an index of deterioration (Berk et al. 2008), none have been developed or validated for the specific purpose of recognising and responding to deterioration in mental state in acute care settings. The ACSQHC scoping study does not address the lack of valid tools for recognising and responding to mental deterioration in non-acute and community settings, even though most mental health care in Australia is community-based (Light et al. 2012). The Victorian Department of Health, Australia, mandated the use of a mental health triage scale in specialist mental health services in the state of Victoria in 2010 (Victorian Department of Health and Human Services 2010). However, no published research was found reporting on the reliability or clinical utility of the scale in assisting clinicians to recognise and respond to clinical deterioration in mental state (The Australian Commission on Safety and Quality in Health Care 2014). The clinical descriptors used in the Victorian mental health scale have not been subject to formal validity testing, and it is presently unknown if they are reliable indicators of mental deterioration. No studies were found reporting on other triage tools currently in use in Australian or international mental health triage or crisis team settings that provide specific guidance on recognising clinical deterioration of mental state. Given the critical role of telephone-based MHT in initial psychiatric assessment, risk assessment and management, and decision-making on

interventions required for optimal patient care (Sands 2009; Sands et al. 2013a), there is an need to improve the evidence-base for recognising and responding to clinical deterioration in mental state.

METHODS

Aims

The primary aim of this research was to identify the patient and service characteristics associated with clinical deterioration of mental state as indicated by unplanned admission to an acute IPU following assessment by TMHT services. The main objective of the research was to generate knowledge to improve understanding of mental deterioration and inform early detection, intervention and prevention strategies at the point of triage.

The research questions addressed in the study were as follows: (i) Which patient and service characteristics predict deterioration in mental state, indicated by admission to an acute IPU, among patients who have been assessed by a telephone-based mental health triage service? (ii) What is the relationship between triage urgency assignment and clinical deterioration?

Design

A retrospective controlled cohort design was used. Two patient groups of TMHT service users were studied to identify predictors of clinical deterioration resulting in admission to IPU: one group who were admitted to IPU subsequent to TMHT assessment, and a control group who were not admitted to IPU admission subsequent to TMHT assessment.

Setting

This research was undertaken in 2015 at two major health services in Victoria, Australia (one regional, one metropolitan). A 7-tier mental health triage scale designed for use in specialist mental health services was used in both sites to record triage (Victorian Department of Health and Human Services 2010). The triage urgency categories used in the Victorian scale are as follows: A=Immediate response (Emergency); B=Within 2 hours (Very urgent mental health response); C=Within 8 hours (Urgent mental health response); D=Within 72 hours (Semi-urgent mental health response) Categories E, F and G have no time-to-treatment descriptors.

Ethical approval

The study was granted ethical approval by the Hospital Human Research and Ethics Committees at both sites and Deakin University Human Research and Ethics Committee (Ethics approval number: 2015-177).

Sample

There were two patient groups in this study: firstly, admitted patients were those who had a known poor outcome (unplanned admission to IPU); and secondly, controls who were patients that did not require an admission following triage assessment. In the absence of previous comparable studies, we specified a priori that an odds ratio of 2.0 would be considered an important clinical difference between the two groups. To have 90% certainty of detecting an odds ratio significantly different from 1 at the 5% level a minimum sample size of 369 was needed in each study group. The samples of admitted and non-patients were drawn consecutively in reverse chronological order from the date of study approval until the required sample size was reached (June-September 2015). The final sample consisted of 817 patients (401 and 416 from the regional and metro sites respectively), with admission in 412 patients and 405 controls.

Data collection

A retrospective audit of the 817 medical records (triage contact forms and admission records) from two major healthcare networks was undertaken to identify factors germane to deterioration in mental state, resulting in unplanned admission to IPU. A 42-item electronic data collection tool was developed from the literature reporting patient and health service risk factors for psychiatric hospitalisation (Alvarez-Jimenez et al 2012; Antypa et al. 2013; Ascher-Svanum et al. 2010; Bodén et al 2011; Dazzey et al 2015; Hawton, et al 2013; Hendin et al. 2007; Hor & Taylor 2010; Hustoft 2013; Links et al. 2012; Mansouri et al 2013; Moustgaard et al. 2014; Novick et al. 2010; Olfson et al. 2011; Oquendo et al. 2006; Pirkola et al. 2009; Tidemalm et al. 2008; Ucock et al. 2006; Unick et al. 2010; Zhang, Havrvey & Andrew, 2011). A literature search was performed using the electronic databases CINAHL, Medline, Psychinfo, EMBASE, Ovid, and Proquest to identify research published in English in the past 10 years reporting on risk factors (predictors) for psychiatric hospitalisation. The following key words were used in various combinations to identify relevant study titles: 'risk factors' 'predictors' 'psychiatric' 'mental health' 'hospitalisation' 'readmission' 'relapse' and 'mental deterioration'. This search strategy yielded 49 potentially relevant article titles that were then screened further for direct relevance to

the study. More than half of the articles were excluded as not directly relevant, for example studies of special populations or studies undertaken in specialist settings such as forensic services. Each of the 20 included articles was screened to identify risk factors pertinent to psychiatric hospitalisation. Risk factors reported across several studies were included in the final audit tool. Patient demographic information and clinical information items relevant to the current episode of care (triage urgency category, time of day, referral source) were also included in the audit tool. The audit tool was then piloted for utility on the first 10 files at each site. Following the pilot testing of the tool drop down boxes were added for several items to improve ease of use (i.e. click instead of write values). Table 1 presents the items used in the audit tool.

INSERT TABLE 1 HERE

Data analysis

Descriptive statistics were used to summarise the data and identify factors significantly associated with admission to IPU. Chi Square, Mann-Whitney U test (for non-normally distributed variables) and regression analyses were used to examine relationships between patient and service characteristics and admission to IPU. Prediction models were developed to investigate the primary study outcome of admission to an inpatient psychiatric unit (IPU). Variables found to be significantly associated with admission (or non-admission) were included in two separate regression models. The first model included patient characteristics only. The second model included service characteristics only. The final model included both patient characteristic and service characteristics predictive of admission to an IPU.

RESULTS

Participant characteristics

A total of 817 patients were included in the study: 401 (49.10%) from the regional MHT service and 416 (50.90%) from the metropolitan service. Equal numbers of admitted (412) and not admitted (405) patients were audited. The average age of admitted (38.84, SD 13.46) and non-admitted (37.22, SD 15.48) patients was not significantly different ($p=0.113$). There was no significant difference in the gender of admitted and non-admitted patients (See Table 2).

INSERT TABLE 2 HERE

Differences between admitted and non-admitted patients

Admitted patients were more likely to be single, unemployed, in receipt of a pension, homeless, have poor social functioning, have previous history of psychiatric treatment, have a history of treatment non-adherence, present with signs or symptoms of a manic episode or psychotic disorder, suicidal thoughts or behaviours, and to have a history of aggression or violence or present a risk of harm to others (Table 2). Of the 248 patients who, at the time of assessment by the TMHT service, were subject to legal orders under the Victorian Mental Health Act, 218 (87.9%) were admitted to the acute inpatient unit ($\chi^2(1)=206.67$, $p<0.001$). The median number of previous admissions to an inpatient unit was significantly higher for patients who were admitted following triage assessment (3, IQR 1-9) than controls (2, IQR 1-6, $p<0.001$).

Of the 143 patients who self-referred (called TMHT), 50 (35%) were admitted in contrast to just over 60 percent of the 193 referred by family members and 53.1 percent of the 262 referrals from other health providers ($\chi^2(1)=29.95$, $p<0.001$). As presented in Table 2, patients who had had recent contact with mental health services and those who had been recently discharged from an inpatient unit were more likely to be admitted ($p<0.001$).

Control patients who were not admitted to an acute IPU following assessment by MHTS were more likely to be a student, to present with depression, anxiety, eating disorder, relationship difficulties, or to have a history of bullying or recent trauma (Table 2).

No significant differences were found for the outcome of interest, admission to an acute IPU, for patients who: were currently receiving psychiatric treatment; had previously received treatment for a substance use disorder; had a history of problematic substance use; were currently intoxicated; currently receiving medical treatment; had a chronic disease; cognitive disorder; personality disorder; or recent change in social status (e.g. job loss).

Patient characteristics associated with admission to inpatient psychiatric units

As presented in Table 3, when patient variables were entered into the regression model alone (i.e. independent of service factors) the strongest predictors of admission were being currently subject to legal orders under the Victorian Mental Health Act

(OR 13.48, 95%CI 7.17-25.36) and to present with a psychotic episode (OR 2.25, 95%CI 1.43-3.59).

INSERT TABLE 3 HERE

Service factors associated with admission to inpatient psychiatric units

Service factors found to be predictive of admission without controlling for patient factors, included being referred by a family member (OR 2.11, 95%CI 1.24-3.59, $p < 0.005$), having a history of recent contact with a mental health service (OR 1.83, 95%CI 1.28-2.62) and receiving a very urgent triage category (OR 2.90, 95%CI 1.91-4.40). See Table 4.

INSERT TABLE 4 HERE

Predictors of admission to inpatient psychiatric unit in patients referred to mental health triage services

After adjusting for confounding factors, the risk-adjusted odds ratio (OR) for IPU admission were highest for patients: with current MHA legal status (OR 13.66, 95%CI 7.01-26.62, $p < 0.001$); presenting with psychotic episode (OR 2.34, 95%CI 1.45-3.78, $p < 0.001$); who were referred by family (OR 2.45, 95%CI 1.09-5.50) or other health care providers (OR 2.20, 95%CI 1.01-4.77); and who were assigned - urgent (OR 3.13, 95%CI 1.79-5.47), very urgent (OR 2.96, 95%CI 1.54-5.71) or emergency (OR 2.38, 95%CI 1.06-5.38) triage codes (Table 5).

DISCUSSION

This study identified a number of sociodemographic and service factors significantly associated with mental deterioration, which may help create a clearer profile of the patient 'at risk' for IPU admission. There were several significant differences in social status between admitted and non-admitted patients. Patients admitted to IPU were more likely to be single, homeless and receiving a pension than not admitted patients. The relationship between social determinants such as economic disadvantage, poverty, unemployment, homelessness and poorer mental health outcomes are reported widely in the literature (Beijer et al. 2010; Fisher & Baum 2010; Goldberg et al. 2011; Lund et al 2010; Molarius et al. 2009; Reiss 2013).) There is also a known relationship between social stressors such as unemployment (Schneider et al. 2011) and relationship breakdown (Kolves et al. 2011) and suicide

risk, highlighting the need for careful assessment of the patient's social circumstances when considering current and imminent risks.

The clinical profile of admitted patients in this study is one of social, clinical and environmental complexity and severity. The admitted patients in this study were more likely to have had complex psychiatric histories with multiple IPU admissions, severe psychotic symptoms, a history of treatment non-adherence, and poorer social functioning than non-admitted patients. These findings are consistent with previous research confirming that poor social functioning, poor adherence to medication, poor functional status, early onset of illness, and more severe symptoms significantly increases the risk for relapse of psychosis and hospitalisation (Alvarez-Jimenez 2012; Ascher-Svanum 2010; Olfson et al. 2011; Uçok et al. 2006). Ching-Hua et al (2010) found that number of previous admissions and early onset of illness as being associated with risk of hospitalization in patients with schizophrenia, and also in bipolar disorder and major depression.

Severe psychiatric symptoms such as suicidal thoughts or behaviours, mania, psychosis and aggressive behaviour were more evident in the admitted than non-admitted patients. Severity of psychotic symptoms (Olfson et al. 2011) and suicidal thoughts and behaviours are well-established signs of psychiatric crisis and known risk factors for admission to IPU (Hor & Taylor 2010). Risk of harm to self or others are core criteria for involuntary treatment under the Mental Health Act (2014) of Victoria, and it would be expected that a significant proportion of the IPU patient population would meet that criteria to warrant admission to IPU.

Another important difference detected between admitted and non-admitted patients was that admitted patients were more likely to have been discharged recently from an inpatient unit. Factors for unplanned readmission have been explored that include admission in the past year, being on a Disability Support Pension, being unemployed, need for follow-up by the treating team within 7 days following discharge and poorer communication on discharge with the person's general practitioner (Callaly et al. 2010). There has been considerable discussion in the literature about the increased risk of suicide and other harms in recently discharged patients (Large et al. 2011; Link et al 2012; Hawton et al. 2013), and this finding could suggest that clinicians are aware of this increased risk, and use this knowledge to inform decision-making on assessing need for admission. On the other hand, there is also commentary to suggest that patients who are discharged too early from IPUs

are at higher risk of relapse and readmission (Callaly et al 2010; Niehaus et al. 2008), and this may also help to explain this finding.

Predictors of admission to IPU

The factors predictive of admission to IPU included involuntary treatment under the Mental Health Act, severe psychotic symptoms, type of referral, and triage urgency category. Given that approximately 60% of public IPU admissions in Australia are involuntary (Australian Institute of Health and Welfare 2011), this first finding is not surprising. Severe psychotic symptoms were also identified as a predictor of admission to IPU in this study. Involuntary treatment is typically used when there is a requirement for urgent treatment for patients with severe mental illness who present a risk to self or others, and who cannot be treated safely in the community (Kallert et al. 2008; Parliament of Victoria 2014).

The admitted patients in this study were assigned high urgency triage categories, which is consistent with decisions to admit to IPU for the provision of urgent mental health care that cannot be provided safely in a less restrictive environment. As previously noted, no published studies have reported the reliability of the Victorian mental health triage scale (Victorian Department of Health and Human Services 2010), but these findings suggest that the scale is being applied as expected and may have some clinical utility.

Being referred to TMHT by family/carer or other health service providers was found to be predictive of admission to IPU. This suggests that family/carers referrals may be an important indicator of mental deterioration in community-dwelling patients. Families and carers play a primary role in the care and management of people with mental illness in the community (Lakeman 2008; Honey et al. 2014) and are best placed to detect behavioural changes that may be indicative of deterioration in mental state (Lyons et al. 2009). Mental health services should be responsive to family and carer circumstances and needs, and work closely with them to recognise and respond to deterioration of mental state and the associated risks (Onwumere et al 2014). In acute medical settings such as trauma and emergency, families are used increasingly as important elements of rapid response systems that aim to improve early detection and response to the deteriorating patient (Brady et al. 2014; Ray et al. 2009). Family activated medical emergency teams (MET) have demonstrated success

in reducing mortality and improving the person-centeredness of healthcare (Gerdik et al. 2010).

No significant differences were found for admission to an acute inpatient unit for patients who had a history of problematic substance use, or who were currently intoxicated. These findings are interesting because there has been a lot of attention focused on the role of substance use/misuse and the at risk mental state. It is widely assumed the most psychiatric patients have comorbid substance use issues, and a history of substance misuse is often cited as a significant risk factor for relapse of mental illness and other harms (Ascher-Svanum 2010; Olfson et al. 2011).

Limitations

The limitations of the study include its retrospective nature. The sample size was adequate rather than extensive. A prospective multi-site study using matched controls is needed to examine clinical deterioration of mental state across the urgency continuum. This study used admission as the main outcome, and this is a proxy of severe mental deterioration. However, admission itself is driven by the factors under study, so a degree of circularity is inherent in this type of study. For example the triage scale contains expected items such as suicide intent/behaviours and severe psychosis that accord with mental deterioration and potential admission. To improve knowledge to inform early detection and intervention, further research is required to examine outcomes over time in patients assessed as low urgency by TMHT to determine which factors may increase or decrease the risk of deterioration in mental state.

Implications for practice

There is an increasing expectation for evidence-based practice in contemporary mental health nursing (Alzayyat, 2014). The study findings describe a profile of clinical deterioration of mental state that can be used by mental health nurses and other health practitioners to inform decision-making and care planning for patients at high-risk for admission to IPU. In keeping with current patient safety practice and models for recognising and responding clinical deterioration, advanced knowledge of risk factors associated with severe mental deterioration can be used to intervene early to mitigate the risk of further deterioration. Knowledge of evidence-based risk factors can also be useful for identifying where health resourcing is most required, for example, in the post discharge period where the evidence shows patients are vulnerable to relapse and readmission (Zhang et al. 2011). Case managed patients

with a high risk profile could be targeted for more assertive outreach that aims to detect signs of mental deterioration and facilitate prompt intervention (Hamilton et al. 2015).

The focus of this study was on identifying patient and service characteristics predictive of admission to IPU in patients assessed by telephone-based mental health triage services. The research achieved its overall goal of deepening understandings of clinical deterioration of mental state in TMHT service-users. Further work is now required to investigate the potential for early identification of mental deterioration in patients assessed as low urgency at triage. Future research should also focus on developing rapid response systems that can be employed at the point of triage to prevent further mental deterioration, and avoid psychiatric hospitalisation.

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TABLE 1: *Audit Tool items*

Demographics

Age
Gender
Metropolitan /Regional/rural

Social status

Single
Employed
Pension
Housing
Student
Family/social support
Poor social functioning
Legal status (Mental Health Act)

Psychiatric history

Current psychiatric treatment
Previous psychiatric treatment
Number of previous admissions to IPU (0-10)
Treatment adherence

Substance use

History of problematic substance use
Previous treatment for substance use disorder
Current intoxication

Medical history

Current medical treatment
Chronic disease
Type of medical condition (explain)

Main presenting problem(s)

Depressive episode (signs/symptoms)
Manic episode (signs/symptoms)
Psychotic episode (signs/symptoms)
Suicidal thoughts/behaviours
Drug and/or alcohol problems
Eating disorder(s)
Cognitive disorder(s)
Anxiety disorder(s)
Violence, aggression, harm to others
Other (explain)

Documented antecedents /situational factors

Relationship breakdown/problems
Substance use issues
Change in social status (eg job loss, housing)
Bullying
Recent trauma
Other (explain)

Service factors

Source of referral
Time of day
Triage Urgency Category
Contacts with MH services (past 4 weeks)
Recent discharge from IPU (within 4 weeks)

TABLE 2. Percentage distribution of patient and service variables by Admission

Variables		Not Admitted (%)	Admitted (%)	N
Gender $c^2(1)=3.35, p=0.067$	Female	52.40	47.60	399
	Male	45.90	54.10	405
Location $c^2(1)=0.00, p=0.999$	Regional/rural	49.80	50.20	402
	Metro.	49.80	50.20	410
Single $c^2(1)=5.38, p=0.020^*$	No	56.90	43.10	188
	Yes	47.30	52.70	620
Employed $c^2(1)=4.037, p=0.045^*$	No	47.00	53.00	609
	Yes	55.40	44.60	186
Pension $c^2(1)=4.74, p=0.029^*$	No	53.80	46.20	292
	Yes	45.70	54.30	473
Housing $c^2(1)=13.51, p=0.000^{**}$	No	32.30	67.70	99
	Yes	52.00	48.00	711
Student $c^2(1)=24.17, p=0.000^{**}$	No	46.40	53.60	714
	Yes	74.40	25.60	86
Poor social functioning $c^2(1)=17.182, p=0.000^{**}$	No	60.40	39.60	227
	Yes	44.10	55.90	565
Treatment adherence $c^2(1)=54.63, p=0.000^{**}$	No	27.60	72.40	351
	Yes	57.40	42.60	256
Legal status (Mental Health Act) $c^2(1)=206.67, p=0.000^{**}$	No	67.20	32.80	545
	Yes	12.10	87.90	248
Previous psychiatric treatment $c^2(1)=28.66, p=0.000^{**}$	No	66.30	33.70	178
	Yes	43.50	56.50	618
Depressive episode (signs/symptoms) $c^2(1)=20.39, p=0.000^{**}$	No	43.60	56.40	516
	Yes	60.00	40.00	300
Manic episode (signs/symptoms) $c^2(1)=41.77, p=0.000^{**}$	No	54.00	46.00	707
	Yes	20.90	79.10	110
Psychotic episode (signs/symptoms) $c^2(1)=121.95, p=0.000^{**}$	No	66.60	33.40	461
	Yes	27.60	72.40	355
Suicidal thoughts/behaviours $c^2(1)=24.97, p=0.000^{**}$	No	41.20	58.80	425
	Yes	58.70	41.30	392
Eating disorder(s) $c^2(1)=6.94, p=0.008^{**}$	No	48.80	51.20	795
	Yes	77.30	22.70	22

Variables		Not Admitted (%)	Admitted (%)	N
Anxiety disorder(s)	No	46.50	53.50	691
$c^2(1)=17.41, p=0.000^{**}$	Yes	66.70	33.30	126
Violence, aggression, potential harm to others	No	56.00	44.00	570
$c^2(1)=30.82, p=0.000^{**}$	Yes	34.80	65.20	247
Relationship breakdown/problems	No	44.70	55.30	499
$c^2(1)=10.133, p=0.001^{**}$	Yes	56.30	43.70	302
Bullying	No	48.40	51.60	768
$c^2(1)=4.71, p=0.03^*$	Yes	69.00	31.00	29
Recent trauma	No	47.60	52.40	694
$c^2(1)=5.73, p=0.017^*$	Yes	60.20	39.80	103
Source of Referral	Other	60.00	40.00	90
$c^2(1)=29.95, p=0.000^{**}$	Self	65.00	35.00	143
	Family	39.40	60.60	193
	Police	46.10	53.90	128
	Health Provider	46.90	53.10	262
Triage Urgency Category	A	53.40	46.60	88
$c^2(1)=29.93, p=0.000^{**}$	B	38.90	61.10	198
	C	45.20	54.80	299
	D	63.40	36.60	227
Recent contact(s) with mental health services (past 4 weeks)	No contact	55.90	44.10	442
$c^2(1)=16.08, p=0.001^{**}$	One contact	40.80	59.20	196
	Two contacts	40.00	60.00	60
	Three + contacts	45.40	54.60	119
Recent discharge from IPU	Other	51.60	48.40	735
$c^2(1)=11.69, p=0.003^{**}$	Within 2 Weeks	32.70	67.30	52
	Within 4 Weeks	30.00	70.00	30

* $p<0.05$, ** $p<0.000$

TABLE 3: Patient characteristics predictive of admission (N=817)

Predictor	Odds Ratio	95% C.I.
Pension	0.48*	[0.29,0.78]
Housing	0.58*	[0.28,1.22]

Treatment adherence	0.61*	[0.39,0.95]
Legal status	13.48**	[7.17,25.36]
Number of previous admissions	1.08*	[1.02,1.15]
Psychotic episode	2.25**	[1.43-3.59]

*p≤0.05, **p≤0.001

TABLE 4: Service Characteristics predictive of admission (N=817)

Predictor	Odds Ratio	95% C.I.
Source of Referral		
Self	0.71	[0.40,1.25]
Family	2.11*	[1.24,3.59]
Police	1.30	[0.73,2.32]
Health Provider	1.47	[0.88,2.45]
Other	ref	ref
Triage Urgency Category		
A	1.39	[0.82,2.35]
B	2.90**	[1.91,4.40]
C	2.15**	[1.49,3.10]
D	ref	ref
Recent contact(s) with mental health services (past 4 weeks)		
One contact	1.83**	[1.28,2.62]
Two contacts	1.53	[0.85,2.76]
Three contacts	1.40	[0.90,2.18]
No contacts	ref	ref

Recent discharge from IPU

Within 2 weeks	2.05*	[1.07,3.92]
Within 4 weeks	2.25	[0.97,5.22]
Not recently discharged	ref	ref

* $p \leq 0.05$, ** $p \leq 0.001$

TABLE 5: Patient and service characteristics combined predictive of admission (N=817)

Predictor	Odds Ratio	95% C.I.
Pension	0.49*	[0.29,0.83]
Treatment adherence	0.61*	[0.38,0.99]
Legal status	13.66**	[7.01,26.62]
Number of previous admissions	1.10*	[1.03,1.17]
Psychotic episode	2.34**	[1.45,3.78]
Source of Referral		
Family	2.45*	[1.09,5.50]
Health Provider	2.20*	[1.01,4.77]
Other	ref	ref
Triage Urgency Category		
A	2.38*	[1.06,5.38]
B	2.96**	[1.54,5.71]
C	3.13**	[1.79,5.47]
D	ref	ref

* $p \leq 0.05$, ** $p \leq 0.001$



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