THE RELATIONSHIP BETWEEN SUBSTANCE USE AND EXIT SECURITY ON PSYCHIATRIC WARDS

ABSTRACT

Aims: In this paper we report on the rates of drug/alcohol use on acute psychiatric wards in relation to levels and intensity of exit security measures.

Background: Many inpatient wards have become permanently locked, with staff concerned about the risk of patients leaving the ward and harming themselves or others, and of people bringing illicit substances into the therapeutic environment.

Methods: In 2004/05, a cross sectional survey on 136 acute psychiatric wards across three areas of England was undertaken. A comprehensive range of data including door locking and drug/alcohol use was collected over six months on each ward. In 2006, supplementary data on door locking and exit security was collected. Door locking, additional exit security measures and substance misuse rates of the 136 wards were analysed and the associations between these investigated.

Results: No consistent relationships were found with exit security features, intensity of drug/alcohol monitoring procedures, or the locking of the ward door. There were indications that use of breath testing for alcohol might

reduce usage and that the use of 'sniffer' dogs was associated with greater alcohol use.

Conclusion: Greater exit security or locking of the ward door had no influence on rates of use of alcohol or illicit drugs by inpatients and thus cannot form part of any strategy to control substance use by inpatients. There are some grounds to believe that greater use of screening might help reduce the frequency of alcohol/substance use on wards and may lead to a reduction in verbal abuse.

KEYWORDS: substance misuse, dual diagnosis, ward security, locked doors, psychiatric inpatients, drug monitoring/testing, sniffer dogs

SUMMARY STATEMENT

What is already known about this topic

- There has been an increase in the number of patients admitted to psychiatric units with substance misuse problems.
- Between a quarter and a third of psychiatric wards are permanently locked to increase the safety of patients and restrict the availability of alcohol and illicit drugs.
- There are concerns that substance use impairs therapeutic endeavours and leads to increased aggression and violence in inpatient settings.

What this paper adds

- Drug use is almost as prevalent as alcohol use amongst inpatients on acute psychiatric wards. On average such incidents occur once every 4-5 days on a 20 bedded ward with considerable variation.
- No consistent relationships were found with exit security features, intensity of drug/alcohol monitoring procedures (including the use of police 'sniffer' dogs), or the locking of the ward door.
- There were indications that use of breath testing for alcohol might reduce usage, and that the use of 'sniffer' dogs was associated with greater alcohol use.

Implications for practice and /or policy

- Locking the ward door has no effect on the rate of use of alcohol or illicit drugs by inpatients so cannot form part of any strategy to control alcohol or substance use by inpatients.
- Greater use of testing or screening for alcohol and drugs might help reduce the frequency of alcohol and substance use.
- Mental health nurse education and development needs to include the knowledge, skills and strategies necessary to work therapeutically with patients presenting with dual diagnoses of mental illness and substance misuse.

INTRODUCTION

A retrospective analysis of psychiatric hospital admissions in England between 1996 and 2006 reported that alongside a 29% decrease in hospital beds there was a shift in case mix towards patients with psychotic and substance misuse disorders. Since 2003, admissions for drug and alcohol related disorders increased by 29% (Keown et al 2008). Evidence from the United States suggests that half of all patients with schizophrenia have a substance misuse disorder (Regier et al 1990) and a survey of psychotic patients in London, England reported that 36% misused drugs or alcohol, with double the admission rates of patients with psychosis alone (Menezes et al 1995).

Partly in response to these changes, many inpatient wards in England have become permanently locked. A survey of London wards in 2001 found 25% to be permanently locked (Bowers et al 2002), and by 2005 a national survey found ‘frequent’ use of door locking on 37% of inpatient psychiatric wards (Garcia et al 2005). Similar levels of door locking (21.4%) were found in a one-day census investigation in five European countries (Austria, Hungary, Romania, Slovakia, Slovenia) (Rittmannsberger et al 2004).

This change in operational policy is driven by concerns about patient safety within these ‘permeable institutions’ (Quirk et al 2006); particularly the risk of a patient leaving the ward and harming themselves or someone else, or of people bringing illicit substances into the therapeutic environment. This last point is also related to concerns that substance misuse may increase violence on wards (Gournay 2005).

BACKGROUND

Three previous studies have mentioned a relationship between substance use and the locked door. The first was a recent Swedish study, where 54 of 193 (29.9%) ward managers believed a locked door prevented illegal substances from entering the ward (Haglund et al 2007). A recent UK study questioning 11 nurses on reasons why they locked the door also found that limiting the amount of substance misuse was a factor (Ashmore 2008). Replies to a somewhat dated survey of 483 open Canadian psychiatric wards, indicated that smuggling of alcohol and drugs did not increase with the opening of ward doors (Wake 1961).

No empirical evidence has been found on substance misuse and door security for UK wards, although there was evidence that 127 out of 264 (48.9%) patients screened in three psychiatric units, fitted the criteria of current or recent substance misuse (Phillips & Johnson 2003). In this particular study, 83% of inner-London psychiatric patients with a history of alcohol or drug use reported that they continued to use illegal substances as inpatients during their admission. Whether this happened on open or closed wards was unclear, but it seems that substance abuse is a problem in inner city and possibly suburban hospitals (Wright et al 2000; 2002).

THE STUDY

Aims

Substance use and exit security on psychiatric wards

The aim of the study was to discover whether rates of drug/alcohol use on acute psychiatric wards were related to levels and intensity of exit security measures.

Methodology and Sample

In 2004 and 2005, a cross sectional survey on 136 acute psychiatric wards was undertaken (Bowers et al 2007a). In that study, a comprehensive range of data on patients, staff, service, and conflict and containment events, including door locking, absconding, and drug/alcohol use, was collected over six months on each of the participating wards.

Acute psychiatric wards were defined as serving acutely mentally disordered adults, taking admissions in the main directly from the community, and not offering long-term care or accommodation. The 136 participating psychiatric wards were geographically near to three centres (London, Central England and North England). Each centre identified all eligible wards within reasonable travelling distance of their research base, including inner city, urban and rural areas as available and accessible. These same wards were re-approached in early 2006 for the collection of supplementary data on door locking and exit security at the time of the previous data collection.

Data collection

As part of the original study, detailed assessments were made of various staff, ward and patient variables on each of the participating wards (see Bowers et

al 2007a; 2008a). In the current paper, the key instrument is the *Patient-staff Conflict Checklist* (PCC) (Bowers et al 2003). The PCC was used to log the frequency of patient conflict behaviours (e.g., absconding, self-harm, violence, substance misuse), as well as the staff containment measures used to maintain safety (e.g. intermittent special observation, constant special observation, seclusion, physical restraint etc., and locking of the ward exit door).

The PCC provides strict definitions of conflict behaviours and containment measures and was completed on each ward at the end of every nursing shift. Alcohol use by a patient (confirmed or suspected) was defined as “either consuming alcohol on the ward or returning from leave intoxicated”. Similarly, other substance misuse by a patient (confirmed or suspected) was defined as “either on the ward or returning from leave under the influence of drugs”.

The PCC has been used successfully in two large scale studies of inpatient psychiatry in which 45,989 PCCs were completed by staff over six months on 136 wards (Bowers et al 2007a) and 15,006 PCCs were returned by 16 wards over a two-year period (Bowers et al 2007b). In tests based on use with case note material, the PCC has demonstrated an inter-rater reliability of 0.69 (Bowers et al 2005), and has shown a significant association with rates of officially reported incidents ($r = 0.24$, $p = 0.011$) (Bowers et al, 2006). Data validity and reliability using the PCC-SR is explored in detail in Bowers et al (2007a).

In the second phase of the study, a follow up interview was specifically designed on door locking policies and ward exit security (Bowers et al 2008b) and the structured 21-item interview was completed with a qualified nurse. Questions were posed during the interview about the ward exit door and other systems and mechanisms aimed at preventing patients from leaving the ward without permission. These included, among others, whether the ward had a so-called air lock system (two doors, instead of one), whether the ward exit door was visible from the staff office, whether a nurse was stationed near the exit door, whether there were CCTV monitors on which patients leaving the ward were visible, as well as questions about alternative escape routes instead of through the front exit door. As three of the 136 wards had been closed down by the time this additional information on exit security was gathered, this detailed information is available for 133 of the initial 136 City-128 study wards. This represents one in four of all acute psychiatric wards in England.

Ethics

Ethical approval was obtained for all parts of the study. Participating organisations are anonymous and all data collection from individuals was subject to informed consent and confidential. No individual patients were identified at any stage.

Analysis

General descriptive statistics were calculated using SPSS v13 to gain insight into the current practices of exit security measures on the participating wards.

On the basis of the PCC data, both door locking and substance misuse rates of the 136 wards from shift to shift were analysed. By means of ANOVAs and Spearman's r correlations the associations between door locking practices, additional exit security measures and substance misuse were investigated.

In addition, multilevel random effects modelling was carried out using MLwiN 2.02 on alcohol and other substance use scores for the shift. Poisson regression was used as this fitted the distribution of scores, and the scores represented counts of incidents. The number of beds on the ward was used as the exposure or offset variable, therefore differences in ward size were accounted for in the model. Random effects modelling allows for the fact that the wards were only a sample of all possible wards and similarly, Trusts were only a sample from all possible Trusts. A three level model was explored with shifts at the lowest level (1), wards at level 2 and Trusts at level 3. That is shifts were nested within wards, which were nested within Trusts. Shifts were chosen as a level because of clustering effects within AM, PM and Night shifts; wards for similar reasons, and Trusts because they represent organisational units with single local policies and operational procedures. The penalised quasilikelihood method of estimation (PQL) was used with second order linearisation, since this method does not tend to underestimate variance estimates (Ukoumunne et al 1999).

The model was produced through a staged process of backward selection, deselecting the least significant at each stage. Each group of variables (e.g., patient variables, staff characteristics etc.) was used to build a separate initial

model and then the significant variables were used to construct a final comprehensive model using the same process of backward selection.

RESULTS

The frequency of alcohol and other substance misuse will be shown, followed by relationships between exit security features and then methods of monitoring of drug and alcohol use and daily rates of alcohol and substance use from the sample wards. We then present the relationship between other study variables, such as patient, staff and service environment variables, and alcohol and substance. Finally we present the results of the multilevel modelling on alcohol and other substance use scores.

Frequency of alcohol and substance use

Alcohol and other substance use is a relatively rare event with the vast majority of shifts passing without any occurrence. Drug use by shift (mean = 0.11, SD = 0.42, N = 46,588) was almost as prevalent as alcohol use (mean = 0.12, SD = 0.41, N = 46,588) amongst inpatients on acute psychiatric wards. The daily rates of alcohol and other drug use by wards are also skewed, with few wards reporting high levels of substance use, although there appear to be a small body of outlying high frequency wards at the top of the scale. The mean daily rates for alcohol use = 0.34 (SD = 0.24, N = 136) and for other substance use = 0.32 (SD = 0.27, N = 136), both standardised to 20 bed wards.

These frequencies represent the numbers of events of suspected or confirmed alcohol or other substance use. Counts of both suspected and confirmed events were grouped together as different wards had different policies regarding testing. However this also means that the measures in part represent nursing perceptions rather than hard physical test data, and may have been affected by expectations, stereotypes, and differing interpretations of patient behaviour. Nevertheless in one study, staff suspicions were confirmed by urine analysis on 60% of occasions (Robinson & Wolkind 1970). Data from other studies suggest that the most commonly used non-alcohol substance is cannabis (Alterman et al. 1982; Isaac et al 2005; Phillips & Johnson 2003).

Frequency of door locking

Whether the ward door was locked, and for what duration was collected for every shift during study via the PCC on a scale of 1 – 5, with 1 representing open for the whole of the shift, and 5 representing locked for the whole of the shift. When aggregated to the level of wards, the mean values of this score showed a U-shaped distribution. Wards at either end of this distribution were classified as 'permanently open' (n = 46, 34%) and 'permanently locked' (n = 41, 30%), with those in between classified as 'partially open' (n = 49, 36%).

One-way analysis of variance of the alcohol and substance use variables by the categorical door lock scores showed no differences, as shown in Table 1. Combining the door lock and security scores in a single index by summing is

also unrelated to alcohol use (r = -0.035, p = 0.690) or other substance use (r = 0.108, p = 0.216).

Table 1. Alcohol and substance use by door lock condition.

INSERT TABLE 1 HERE

Univariate relationships between exit security, door locking and alcohol/substance use

These relationships were tested using Spearman correlations between exit security features and mean daily rates of alcohol and substance use from the sample wards. The results are displayed in Table 2, and show no significant relationships. Neither did a relationship appear when the combined security score was related to alcohol use (r = -0.027, p = 0.758) or other substance use (r = -0.03, p = 0.731).

Table 2: Spearman correlations between alcohol/substance use rates and exit security features.

INSERT TABLE 2 HERE

Univariate relationships between drug and alcohol monitoring and alcohol/substance use

The frequency of different methods of monitoring alcohol or other substance use is displayed in Table 3. In addition, fifty wards (37%) reported that they were using police 'sniffer' dogs to search the wards for illegal drugs.

Relationships between drug and alcohol monitoring items and mean daily rates of alcohol and substance use from the sample wards were tested using Spearman correlations. The results are also displayed in Table 3 and show some significant relationships. These relationships do not make immediate sense, as screening for alcohol use either randomly or on return from leave seemed to be associated with lower rates of other substance use. However the use of alcohol testing showed greater variability across the sample, with significant numbers of wards reporting they did not use it at all. This may have made relationships easier to see. By comparison, there was little variability in the use of drug testing. The use of 'sniffer' dogs was not associated with less drug use, but was associated with more use of alcohol, perhaps suggesting a degree of substitution. There was no relationship between the total drug and alcohol monitoring score and alcohol use ($r = 0.011$, $p = 0.902$) or other substance use ($r = -0.085$, $p = 0.323$).

Table 3. Frequency of alcohol and drug monitoring items by ward and Spearman correlations between alcohol/substance use rates and drug and alcohol monitoring items.

INSERT TABLE 3 HERE

Univariate relationships between alcohol and other substance use to other variables

Significant relationships between alcohol and other substance use to a number of patient, service environment, conflict, containment and staff demographics variables are shown in Table 4. Information about patients, conflict and containment was collected by the PCC-SR end of shift report. Staff demographics and service environment data were collected from staff. Some data were available on 16,240 admissions, although sometimes there was missing data (diagnosis, age, and postcode are not always known at the time of admission and this is when these items were collected by staff). From this data were derived, by ward, the proportion of admissions: male, diagnosed with schizophrenia, aged under 35 years, sectioned under the Mental Health Act, admitted for harm to self, admitted for harm to others, ethnicity (White, Irish, Caribbean, African, South Asian, Other). Postcodes were collected on 5,808 of these admissions, and 4,112 of these were found to be valid and possible to match to area data, allowing the calculation by ward of a mean Index of Multiple Deprivation (IMD, Noble et al 2004), and Social Fragmentation Score (SFS, Congdon 1996, Whitley et al 1999).

Table 4. Descriptive statistics and univariate associations for patient, service environment, conflict, containment and staff demographic variables

INSERT TABLE 4 HERE

Multi-level models of alcohol and other substance use

Multilevel random effect modelling was carried out using MLwiN 2.02 on alcohol and other substance use scores for the shift. Tables 5 and 6 depict the resulting models. The first results column of each table shows the models resulting from within domains analyses (i.e. just the patient variables, or just the service environment variables), the second results column shows the final combined model, and the third column shows the level at which associations occur.

Table 5. Multilevel models of alcohol use, with incident rate ratios and confidence intervals

INSERT TABLE 5 HERE

Table 6. Multilevel models of other substance use, with incident rate ratios and confidence intervals

INSERT TABLE 6 HERE

Exit security was not significant in any model; neither was the status of the main ward door, whether locked or open. Intensity of drug and alcohol monitoring was also unrelated to use. Both alcohol and substance use were positively associated with the proportion of male admissions and admissions

during the shift, while substance use was further associated with the proportion of admissions suffering from schizophrenia. There are multiple strong associations between alcohol and especially other substance use with other conflict behaviours, perhaps notably absconding. Alcohol use was more strongly associated with aggressive behaviour than substance use. Although there were multiple associations with different containment measures for substance use, alcohol use was associated with both the provision of seclusion and its use. There appears to be a consistent association of higher bank/agency staffing numbers with alcohol/substance use.

The full models show that for substance use the relationships with other variables were predominantly at the shift level, however for alcohol use there were Trust as well as shift level associations. Further inspection of the variance partitioning tables shows that for alcohol use, the relationship with many of the conflict variables is either mostly or partially at the Trust level. In particular this raises questions about the relationship between alcohol use and rates of aggressive behaviour on the wards. The associations with staffing variables and seclusion use were also at Trust level for alcohol use. For substance use, there were also a number of relationships at the Trust as well as at the shift level, but these did not include aggression or staffing variables.

DISCUSSION

There are a number of limitations to this study. First, the data on exit security was collected some time later than the outcome data, and the recollection of the staff member interviewed by telephone about the state of affairs when the

outcome data was first collected may not have been totally accurate. Policies can change quite fast in acute psychiatry, especially in relation to door locking and exit security. The second main limitation is the cross sectional nature of the dataset. The significant correlations reported cannot identify the direction of causality. Firm conclusions cannot therefore be drawn from these correlations, which are subject to a variety of different interpretations. In addition, the modelling strategy used is likely to identify some variables as significant purely by chance. However the large scale of the study, the number of potential confounding variables incorporated in the analysis, and the statistical allowance made for the clustering of responses by organisation, all increase the accuracy and the reliability of the findings.

Drug use was almost as prevalent as alcohol use amongst inpatients on acute psychiatric wards. On average such incidents occurred once every 4-5 days on a 20 bedded ward, with considerable variation between wards. No consistent relationships were found with exit security features, intensity of drug/alcohol monitoring procedures (including the use of police 'sniffer' dogs), or the locking of the ward door. There were indications that use of breath testing for alcohol might reduce usage, and that the use of 'sniffer' dogs was associated with greater alcohol use.

There are some grounds to believe that greater use of testing might help reduce the frequency of alcohol/substance use, although the lack of variability in some practices between wards made relationships difficult to determine. Testing may make patients disinclined to consume alcohol or substances for a

number of reasons: fear of legal consequences with drugs; threat of treatment termination; and possibly some degree of shame on being discovered. The nature of the findings perhaps suggest that the occasional use of testing is superior to never using such tests, as it is in relation to alcohol testing (significant numbers of wards do no alcohol testing at all), where associations with reduced use are visible. It is less clear whether there are any gains to be made through the introduction of random testing to all patients, or testing of all patients on admission or return from leave. Very few wards operate such blanket policies.

About a third of wards reported that they were using Police 'sniffer' dogs to regularly check the wards for illegal substances, and there are accounts of this practice in the literature (Rands 2004). This appeared to be unrelated to actual rates of substance use; however such a lack of relationship could have emerged through the preferential and effective use of this practice on wards with historically high levels of substance use. An inverse relationship between the practice and substance use would have given firmer evidence of its efficacy. However the positive association with alcohol use is suggestive of efficacy, in that patients might be substituting illegal drugs with alcoholic drinks.

Both testing and the use of ‘sniffer’ dogs have associated ethical problems related to invasiveness and patient consent (Nash 2005). The evidence from this study is not by itself strong enough to provide a justification for either of these interventions. It is perhaps clearer that greater exit security or locking of

the ward door had no influence on rates of intoxication, and thus cannot form part of any strategy to control alcohol or substance use by inpatients. Interestingly, in an associated questionnaire survey, the majority of patients, staff and visitors all agreed that locking the door would do little to keep drugs and alcohol off the ward (Bowers et al 2008b). Of course, decisions to lock wards doors are premised on a wide range of factors and these are explored elsewhere (Bowers et al 2008b).

The proportion of patients admitted suffering from schizophrenia was associated with substance use, confirming current concerns about the growing problem of co-morbidity (Green et al 2007). Interestingly, there was an indication that the presence of an Assertive Community Treatment team led to a reduction in such dual diagnosis admissions, reflecting the fact that such teams deal with difficult, unstable, frequently admitted and often substance abusing patients with schizophrenia. Both alcohol and substance use events were associated with admissions during the shift, perhaps reflecting the admission of disturbed and intoxicated persons. The link between these behaviours and absconding perhaps also reflect an association with the acquisition and consumption of alcohol/substances and/or the returning to the ward intoxicated. As such this may be indicative evidence that being on the ward does to some degree suppress such behaviours, a proposition supported by evidence from other studies that 13-70% of patients who consume drugs and/or alcohol regularly in the community cease during their admission (Alterman et al 1980; Alterman, et al 1982; Blumberg et al 1971; Isaac et al 2005; Phillips & Johnson 2003).

There has been considerable concern expressed by nurses over links between intoxication, especially that produced by illegal drug use, and extreme violence and assaultive behaviour by patients (McKeown & Leibling 1995; Van Putten et al 1976). Links between alcohol/substance use and violence in the general community are well known (Yesavage & Zarcone 1983). However it has not so far been possible to substantiate this association for psychiatric inpatients (Bowers et al. 2005). The evidence from the analysis presented here is also unclear. Associations were found for both alcohol and substance abuse with verbal aggression, suggesting that there might be such a link. However for alcohol use, the level at which this association occurred was that of Trusts, suggesting that this was a rather generic association that was related to Trust operation, rather than a specific within shift association of the intoxicated person being aggressive. The link between substance use and verbal aggression was more specifically at the shift level. The difficulty in demonstrating these links statistically may have several reasons. Actual physical violence is very rare compared to rates of alcohol/substance use, and probably has many other causes. In addition, most substance use is of cannabis, which does not generally lead to aggressive behaviour. It is the more rare cases of stimulant use (amphetamines, crack cocaine) that are of more concern and are perhaps more likely to be associated with violence.

The association found between alcohol use and seclusion is concerning. This does suggest that intoxicated patients are dealt with through a process of exclusion and isolation. However the level at which the association occurs is

again at the level of Trusts rather than shifts or wards. The variance partitioning table suggests that some Trusts have a particular constellation of issues associated with high alcohol use by inpatients, including aggressive behaviours, rule breaking, seclusion use, low levels of qualified nursing staff, high levels of bank/agency qualified staff, and a greater preponderance of male staff. These interlinked issues do not appear to be related to the social features of the districts served, as there was no link between alcohol use and deprivation and social fragmentation. Without further data this may be impossible to explain, however it could be speculated that there might be differences between Trusts in the nature and operation of services for meeting the needs of patients with alcohol dependency problems, resulting in different admission policies for detoxification, thus resulting in different patterns of behaviour on the wards.

The associations between staffing variables and alcohol/substance use are also difficult to interpret. Both are positively associated with greater numbers of bank/agency staff on duty. Such staff receive a rather bad press (Audit Commission 2001), and it is tempting to interpret this association in a causal fashion. However it is also possible to see this association as a product of the use of temporary staff for special observation and other extra duties when the ward is 'disturbed'. The variance partitioning exercise does not help here, as for alcohol use the association is at the level of Trust, whereas for substance use it is at the level of shift. It is also worth noting that in both cases there is indicative evidence that the presence of regular staff is associated with lower rates of alcohol/substance use, the finding that has been reported in another

study (Bowers et al 2007) and is also present in the first phase study data for self-harm (Bowers et al 2008c).

CONCLUSION

Locking the ward door has no effect on the rate of use of alcohol or illicit drugs by inpatients and thus cannot form part of any strategy to control alcohol or substance use by inpatients. A questionnaire survey linked to this study, suggests that the majority of patients, staff and visitors recognise that locking the door would do little to keep drugs and alcohol off of psychiatric wards.

However, there are some grounds to believe that greater use of testing for alcohol and drugs might help reduce the frequency of alcohol and substance use. The results suggest that occasional use of testing is superior to never using such tests and although there does not appear to be a strong association between alcohol/substance use and aggression overall, there is some evidence that increased testing may decrease the use of alcohol in particular and lead to a reduction in verbal abuse. It is less clear whether there are any gains to be made through the introduction of random testing to all patients, or testing of all patients on admission or return from leave. In addition, while both testing and the use of ‘sniffer’ dogs have associated ethical problems related to invasiveness and patient consent, the evidence from this study is not by itself strong enough to provide a good justification for either of these interventions.

Psychiatric wards reflect the societies they are part of, so substance use is likely to remain a potent challenge for nursing and other staff in managing the safety, care and treatment of mental health patients on inpatient units for

some time to come. The use of alcohol and illicit drugs on psychiatric wards is a concern to service users, as the therapeutic environment is sullied and patients can often be pressured by other patients to obtain substances for use on the ward (Jones et al 2010).

Staff, service users and the public need to engage in open and honest discussions about the difficulties faced and collaborate in developing policies and practices that are both practical, beneficial and acceptable to all involved. Mental health nurse education and professional development needs to include the knowledge, skills and strategies necessary to work therapeutically with a patient population increasingly presenting with mental illness and substance use.

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CONFLICT OF INTERESTS

No conflict of interest has been declared by the author(s).

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Substance use and exit security: Tables

Table 1. Alcohol and substance use by door lock condition.

	Alcohol use mean	Other substance use mean
Always locked	0.310	0.329
Partially locked	0.390	0.340
Never locked	0.329	0.286
F	1.404	0.533
df	2,133	2,133
p	0.249	0.588

Table 2: Spearman correlations between alcohol/substance use rates and exit security features.

	Alcohol use		Other substance use	
	r	p	r	p
Number of front doors and presence of interlock	0.039	0.653	-0.024	0.786
Thickness of front door	-0.015	0.861	-0.079	0.37
Noise on opening	-0.102	0.242	-0.003	0.969
Nursing office next to the door	0.095	0.279	0.15	0.084
Use of nurses as door guards	0.13	0.135	-0.027	0.754
CCTV for viewing those leaving the ward	-0.083	0.345	-0.059	0.497
Front door automatically unlocks if fire alarm sounds	0.009	0.921	-0.026	0.765
When outside front door, patient has to pass further locked doors	-0.028	0.746	0.066	0.453
Staffed unit reception desk that person leaving has to pass	0.002	0.98	0.05	0.566
Gatehouse etc at exit to the hospital grounds	-0.112	0.198	0.041	0.636
Fire door that patients cannot release to exit	0.217	0.012	0.22	0.011
Other exits windows	-0.11	0.209	0.025	0.772
Other exists doors	-0.055	0.528	-0.025	0.773
Other exits gardens	-0.021	0.806	-0.055	0.527
Number of other exits	0.067	0.442	0.052	0.554

Table 3. Frequency of alcohol/drug monitoring items by ward and Spearman correlations between alcohol/substance use rates and drug and alcohol monitoring items.

	Frequency of drug and alcohol monitoring by ward						Spearman correlations between alcohol/substance use rates and drug and alcohol monitoring items			
	Never		Sometimes		Always		Alcohol		Other substance use	
	n	%	n	%	n	%	r	p	r	p
(Illegal drugs) urine or blood testing	3	2.2	79	58.1	54	39.7	-0	0.974	0.006	0.945
Reporting to the police if drugs discovered	5	3.7	73	53.7	58	42.6	0.088	0.306	0.047	0.588
(Illegal drugs) urine or blood testing on return from leave	1	0.7	131	96.3	4	2.9	0.01	0.912	0.049	0.573
(Illegal drugs) random urine or blood testing	9	6.6	115	84.6	12	8.8	0.152	0.078	0.126	0.142
(Illegal drugs) urine or blood testing upon reasonable suspicion			52	38.2	84	61.8	0.05	0.565	0.008	0.925
(Alcohol) breath or blood testing on admission	25	18.4	103	75.7	8	5.9	-0.09	0.313	-0.123	0.155
(Alcohol) breath or blood testing on return from leave	22	16.2	113	83.1	1	0.7	-0.15	0.081	-0.278	0.001
(Alcohol) random breath or blood testing	30	22.1	101	74.3	5	3.7	-0.11	0.21	-0.198	0.021
(Alcohol) breath or blood testing upon reasonable suspicion	15	11	9	50.7	52	38.2	-0.13	0.127	-0.189	0.028
Use of police sniffer dogs to search ward for illegal drugs							0.199	0.02	0.102	0.238

Table 4. Descriptive statistics and univariate associations for patient, service environment, conflict, containment and staff demographic variables

Variable	Alcohol use		Other substance use		Level entered	Entered as z score
	r	p	r	p		
Patient variables						
Proportion of admissions male	0.275	0.001	0.400	<0.001	Ward	Yes
Proportion of admissions with schizophrenia	0.184	0.032	0.480	<0.001	Ward	Yes
Proportion of admissions under 35	0.164	0.057	0.381	<0.001	Ward	Yes
Proportion of admissions detained under MHA	0.014	0.872	0.346	<0.001	Ward	Yes
Proportion admitted for risk of harm to others	0.089	0.305	0.405	<0.001	Ward	Yes
Index of Multiple Deprivation	0.051	0.558	0.305	<0.001	Ward	Yes
Service environment variables						
Admissions during shift	0.036	<0.001	0.022	<0.001	Shift	Yes
Conflict variables						
Verbal aggression	0.097	<0.001	0.105	<0.001	Shift	Yes
Physical aggression against objects	0.063	<0.001	0.058	<0.001	Shift	Yes
Physical aggression against others	0.054	<0.001	0.050	<0.001	Shift	Yes
Smoking in non smoking area	0.100	<0.001	0.166	<0.001	Shift	Yes
Refusing to eat	0.032	<0.001	0.046	<0.001	Shift	Yes
Refusing to drink	0.035	<0.001	0.044	<0.001	Shift	Yes
Refusing to attend to personal hygiene	0.049	<0.001	0.104	<0.001	Shift	Yes
Refusing to get out of bed	0.015	0.002	0.053	<0.001	Shift	Yes
Refusing to go to bed	0.039	<0.001	0.061	<0.001	Shift	Yes
Refusing to see workers	0.036	<0.001	0.052	<0.001	Shift	Yes
Attempted absconding	0.069	<0.001	0.062	<0.001	Shift	Yes
Absconding (missing without permission)	0.119	<0.001	0.091	<0.001	Shift	Yes
Absconding (officially reported)	0.084	<0.001	0.066	<0.001	Shift	Yes
Refused regular medication	0.027	<0.001	0.042	<0.001	Shift	Yes
Refused PRN medication	0.041	<0.001	0.069	<0.001	Shift	Yes
Demanding PRN medication	0.071	<0.001	0.081	<0.001	Shift	Yes
Containment variables						
PRN medication	0.048	<0.001	0.052	<0.001	Shift	Yes
IM medication (enforced)	0.037	<0.001	0.051	<0.001	Shift	Yes
Sent to PICU or ICA	0.026	<0.001	0.028	<0.001	Shift	Yes
Seclusion	0.045	<0.001	0.036	<0.001	Shift	Yes
Special observation (constant with engagement)	0.035	<0.001	0.043	<0.001	Shift	Yes
Special observation (constant without engagement)	0.024	<0.001	0.014	0.003	Shift	Yes
Show of force	0.052	<0.001	0.062	<0.001	Shift	Yes
Manually restrained	0.051	<0.001	0.052	<0.001	Shift	Yes
Time out	0.025	<0.001	0.047	<0.001	Shift	Yes
Staff demographics variables						
Bank/agency qualified nurses on duty	0.010	0.029	0.017	<0.001	Shift	Yes
Bank/agency unqualified nurses on duty	-0.001	0.775	0.029	<0.001	Shift	Yes
Proportion staff male	0.258	0.002	0.344	<0.001	Ward	Yes

Table 5. Multilevel models of alcohol use, with incident rate ratios and confidence intervals

	Domain models				Final combined model				Level of effect		
	IRR	Lower 95% C.I.	Upper 95% C.I.	sig.	IRR	Lower 95% C.I.	Upper 95% C.I.	sig.	Trust	Ward	Shift
Patient											
Proportion male*	1.264	1.126	1.419	<0.001							
Service environment											
Seclusion on ward vs no selcusion*	1.645	1.099	2.464	<0.05							
Seclusion on site vs no seclusion*	1.147	0.858	1.533	ns							
Admissions during shift	1.126	1.100	1.153	<0.001	1.087	1.061	1.112	<0.001			x
Physical environment											
Windors in doors of single rooms (some)*	1.548	0.809	2.962	ns	0.592	0.578	0.606	<0.05	x		
Windors in doors of single rooms (none)*	1.611	1.031	2.519	<0.05							
Patient routines											
None significant											
Conflict											
Verbal aggression	1.129	1.098	1.160	<0.001	1.132	1.101	1.164	<0.001	x		
Aggression against objects	1.030	1.008	1.053	<0.01	1.024	1.002	1.047	<0.05	x		
Smoking in no smoking areas	1.108	1.072	1.146	<0.001	1.106	1.070	1.144	<0.001	x		
Refusing to eat	1.029	1.002	1.058	<0.05	1.030	1.003	1.059	<0.05	x		x
Refusing to get up and out of bed	0.942	0.918	0.966	<0.001	0.949	0.924	0.976	<0.001	x		
Refusing to go to bed	1.033	1.010	1.055	<0.01							
Other substance misuse	1.249	1.236	1.261	<0.001	1.245	1.233	1.257	<0.001	x		x
Attempting to abscond	1.030	1.008	1.053	<0.01	1.030	1.008	1.053	<0.01			
Absconding (missing without permission)	1.119	1.099	1.138	<0.001	1.119	1.099	1.138	<0.001			x
Absconding (official report)	1.057	1.036	1.077	<0.001	1.054	1.034	1.075	<0.001			x
Demanding PRN medication	1.070	1.045	1.096	<0.001	1.065	1.040	1.090	<0.001	x		x
Containment											
Given PRN medication	1.089	1.059	1.119	<0.001							
Sent to PICU or ICA	1.028	1.006	1.051	<0.05							
Seclusion	1.037	1.021	1.053	<0.001	1.031	1.013	1.050	<0.001	x		
Special observation (intermittent)	1.099	1.058	1.140	<0.001							
Special observation without engagement	1.036	1.012	1.060	<0.01							
Show of force	1.073	1.050	1.096	<0.001							
Physically restrained	1.040	1.020	1.060	<0.001							
Staff characteristics											
Qualified staff	0.935	0.905	0.967	<0.001	0.922	0.892	0.953	<0.001	x	x	
Bank/agency qual staff	1.067	1.036	1.099	<0.001	1.038	1.006	1.071	<0.05	x		
Number of consultant psychiatrists who are locums*	1.166	1.027	1.325	<0.05							
Proportion staff male*	1.267	1.127	1.426	<0.001	1.195	1.075	1.328	<0.01	x		
Staff group factors											
Staff ACMQ mean*	1.148	1.013	1.301	<0.05							

*Variables entered at ward level

Table 6. Multilevel models of other substance use, with incident rate ratios and confidence intervals

	Domain models				Final combined model				Level of effect		
	IRR	Lower 95% C.I.	Upper 95% C.I.	sig.	IRR	Lower 95% C.I.	Upper 95% C.I.	sig.	Trust	Ward	Shift
Patient											
Proportion male*	1.283	1.114	1.477	<0.001	1.224	1.084	1.382	<0.001			
Proportion schizophrenia*	1.340	1.166	1.541	<0.001	1.239	1.101	1.393	<0.001		x	
Service environment											
Assertive outreach team available*	0.674	0.461	0.983	<0.05							
Admissions during shift*	1.101	1.073	1.129	<0.001	1.060	1.033	1.087	<0.001	x		
Physical environment											
Environment quality*	0.834	0.715	0.971	<0.05							
Patient routines											
None significant											
Conflict											
Verbal aggression	1.091	1.063	1.119	<0.001	1.071	1.044	1.099	<0.001		x	x
Smoking in no smoking area	1.236	1.198	1.276	<0.001	1.224	1.186	1.263	<0.001			x
Refusing to wash	1.084	1.061	1.108	<0.001	1.079	1.056	1.102	<0.001			x
Refusing to go to bed	1.067	1.048	1.086	<0.001	1.064	1.045	1.083	<0.001			x
Refuse to see workers	1.027	1.007	1.048	<0.01	1.023	1.003	1.044	<0.05			x
Alcohol use	1.237	1.225	1.250	<0.001	1.234	1.222	1.246	<0.001	x		x
Absconding missing	1.046	1.022	1.071	<0.001	1.043	1.019	1.068	<0.001			x
Absconding official	1.049	1.027	1.072	<0.001	1.047	1.025	1.070	<0.001			x
Refusing prn medication	1.040	1.018	1.062	<0.001	1.031	1.008	1.056	<0.01			x
Demand prn medication	1.092	1.067	1.118	<0.001	1.085	1.060	1.111	<0.001			x
Containment											
PRN meds	1.090	1.058	1.122	<0.001							
IM meds	1.043	1.021	1.066	<0.001	1.030	1.007	1.055	<0.05			x
Sent to PICU	1.046	1.026	1.067	<0.001	1.038	1.016	1.060	<0.001	x		
Intermittent observation	1.186	1.143	1.232	<0.001	1.068	1.029	1.109	<0.001	x	x	
Show of force	1.074	1.053	1.095	<0.001							
Time out	1.064	1.039	1.089	<0.001	1.030	1.005	1.057	<0.05		x	
Staff characteristics											
Unqualified staff	0.958	0.927	0.990	<0.05							
Bank/agency qual staff	1.054	1.022	1.088	<0.001	1.042	1.010	1.075	<0.01			x
Proportion staff male*	1.336	1.158	1.542	<0.001							
Staff group factors											
Staff ACMQ mean*	1.212	1.046	1.404	<0.05							
WAS order & org/prog. clarity*	0.811	0.700	0.940	<0.01							

*Variables entered at ward level