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Adverse incidents, patient flow and nursing workforce variables on acute psychiatric wards: The Tompkins Acute Ward Study

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Adverse incidents, patient flow and nursing workforce variables on acute psychiatric wards: The Tompkins Acute Ward Study

ABSTRACT

Background: Adverse incidents (violence, self-harm and absconding) can cause significant harm to patients and staff, are difficult to predict, and are driving an increase in security measures and defensive practice.

Aims: To explore the relationship between adverse incidents on acute psychiatric wards, admissions and nursing workforce variables.

Methods: A retrospective analysis of officially collected data covering a period of 30 months on 14 acute wards at three Hospitals. This data included 69 serious untoward incidents.

Results: Adverse incidents were more likely during and after weeks of high numbers of male admissions, during weeks when other incidents also occurred, and during weeks of high regular staff absence through leave and vacancy.

Conclusions: It may be possible to predict adverse incidents. Careful staff management and deployment may reduce the risks.

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BACKGROUND

Adverse incidents are a matter of no small concern to the providers of acute inpatient psychiatric services. Patients pose the most risk, and are most vulnerable during the acute phases of their illness. These risks can, in rare cases, be extremely serious and include homicide or suicide. However, even the less severe incidents can result in injuries to staff and patients, both physical (Hunter & Carmel, 1992) and psychological (Needham, Abderbalden, Halfens, Fischer, & Dassen, 2005).
There is a great deal of public concern about these incidents, sometimes leading to public inquiries (Sheppard, 1996), and always resulting in a careful investigation of potential causal factors. However the prediction and prevention of these incidents is not easy, and some argue that anxiety about patient safety is fomenting excessively defensive practice by psychiatric professionals (Wells, 1995). The data we report here were collected as part of the Tompkins Acute Ward Study, a multi-method longitudinal investigation of links between adverse incidents and staff factors.

AIM

To explore and model the relationship between adverse incidents (a) patient throughput, and (b) nursing workforce variables.

METHOD

Design

Retrospective analysis of officially collected data.

Sample

Data were drawn from official reporting systems of one NHS Trust in London UK. Fourteen acute psychiatric wards on three hospital sites were included in the sample. One was a female only ward, a second acted as an assessment ward, the remainder were mixed gender wards serving a specific locality. The period covered by our data was from 2002 (week 14) to 2004 (week 45), roughly two and a half years.

Data collection

Data on admissions and discharges is routinely collected in the study district, and this was provided to the authors anonymised, with age, gender, ethnicity and primary, secondary and tertiary diagnosis. This data is collected and entered by a combination of professionals and administrative staff. Dates of admissions and discharges, age, and gender were robust and comprehensive. Ethnicity data was less comprehensive (14%

missing). Primary diagnoses were fully comprehensive, but not all patients had been categorised with secondary or tertiary diagnoses. Data were available for the full study period, 1,709 ward weeks.

Data on adverse incidents are routinely collected by nursing reports, which are entered on a proprietary computer system. We were provided with the dates and wards of all incidents falling into the following categories: verbal abuse, property damage, physical assault, self-harm, and absconding. Some of these incidents were severe, requiring special investigation and report, and these were referred to as 'serious untoward incidents' (SUIs). An SUI was any incident where medical treatment was required or death occurred, or where moderate to high financial loss, or loss of reputation might occur. Managers, using guidelines from the National Patient Safety Agency, decided whether an incident was counted as an SUI. One hospital only commenced using the proprietary incident recording system in 2003 (week 36), so for five wards in our sample this data is less comprehensive. For the remaining 9 wards data covering the full study period was available. This provided 1,404 ward weeks of observations.

Since 2003 (week 44) information on workforce availability and deployment (vacancy and sick, study, annual and maternity leave rates, bank and agency staff usage, and special observation hours.) were centrally returned on a weekly basis by ward managers, and collated on a spreadsheet. This data was also obtained, for analysis, by the authors, and covered 570 ward weeks.

Permission to access and use these sources of data was provided by the NHS Trust managers and by the Local Ethics Committee.

Data analysis

On receipt, data was screened for outliers and obvious errors, which were checked against other sources of information and/or removed. All data was then imported into a database program and collated using structured query language (SQL). The data was then exported as text files and imported into STATA for statistical analysis. An ethnic minority admission was counted as any admission not explicitly identified in our data as "White British". A psychotic admission was counted as any with a primary diagnosis of any organic or functional psychosis. A substance use admission was counted as any with a primary, secondary or tertiary diagnosis of substance use, inclusive of alcohol.

Poisson regression modelling was used to identify individual variables that might have a significant effect on various incident types. The modelling used the occupied bed days as the exposure variable in all analyses as this allowed for the differing ward size. Lagged variables, of one and two weeks, were created for admission variables to examine any time dependent effects of admissions on the wards. Any variables found to be significant in univariate models were then entered into a multivariable Poisson regression to examine the relative importance of the variables in the final model selected for each incident type. Variables were eliminated in a backward selection process deselecting the least significant at each stage. This analytic strategy was applied to all incidents, and in a separate exercise to serious untoward incidents.

Incident rate ratios are reported for each model's significant independent variables. These are a measure of relative incidence of the dependent variable due to an independent variable. For example, if the dependent variable is incidents and the independent variable is admissions and the IRR for the independent variable is 1.5. Then for a one unit increase in admissions there is an increase of 1.5 in incidents.

FINDINGS

Table 1 gives frequency data for the variables reported in this study. These are provided as raw frequencies per week, then as adjusted to either occupied bed days or numbers of beds, to enable subsequent researchers to make accurate comparisons (Bowers, 2000).

Serious untoward incidents

The incident rate ratios for each of the serious untoward incident models are presented in Table 2. There appears to be an association between total number of SUIs and increased under 36 years of age admissions, increased male admissions the previous week and reduced psychotic admissions two weeks previously (adj r^2=0.025, p=0.003). The variables significantly associated with serious absconds were verbal aggression, and increases in all admissions, no matter their specific diagnosis (adj r^2=0.06, p=0.002). The only variable significantly associated with serious aggression was an increase in property damage (adj r^2=0.02, p=0.029). The only significant

variable associated with serious self-harm was an increase in the one week lag in male admissions, that is male admissions from the previous week (adj r^2=0.03, p=0.018).

All incidents (SUIs and others)

The incident rate ratios for each of the other incident models are presented in Table 3. The model showed that increases in total staff absence, overall discharges, male admissions during the week as well as those from one and two weeks' prior were significant predictors of total incident numbers. The winter season had significantly more incidents compared to the other seasons (adj r^2=0.059, p<0.0005). The variables significantly associated with physical aggression were increases in one week lag in male admissions, verbal aggression, absconding and total staff absence and vacancy (adj r^2=0.04, p<0.0005). Verbal aggression was significantly associated with increases in psychotic admissions, physical aggression and property damage (adj r^2=0.038, p<0.0005). Self-harm was significantly associated with increases in physical aggression, total staff absence and all discharges (adj r^2=0.065, p<0.0005). Property damage was significantly associated with increases in male admissions, physical aggression, verbal aggression, deliberate self-harm but also with a decrease in substance abuse admissions from the two weeks prior to the damage (adj r^2=0.06, p<0.0005). Absconding was significantly associated with increases in psychotic admissions from the previous week, physical aggression, verbal aggression and observation hours but also with a decrease in minority ethnic admissions from the previous week (adj r^2=0.079, p<0.0005).

DISCUSSION

There is currently no national data on the nursing workforce variables we report, although several papers suggest that, per week per ward, between 44 and 455 hrs of nursing time is spent on special observation (Childs, Thomas, & Tibbles, 1994; Porter, McCann, & McGregor, 1998). Our results (45 hrs) are at the lower end of this continuum. The available national data on admissions does not separate out acute admissions, and does not give admission rates to bed number ratios, making comparisons difficult. Smith et al (1996) use 1991/2 data from England to give an admission rate (including children) of 4.2 per 1,000 population, whereas Thompson et al (2004) give a lower figure (excluding children) of 3.2 per thousand for the year 1999/2000. Our figure, calculated from Table 1, for adult acute admissions only, is 4.3 per 1000 population. The varying ways in which violent incident rates have been reported, coupled with the differing criteria used, make comparisons exceedingly difficult. Fottrell et al (1978) surveyed violence in a UK hospital, and it is possible to estimate a figure of 0.68 incidents per 100 bed days from their data, with a similar study providing an estimate of 0.63 per 100 bed days for 1987 (Noble & Rodger, 1989). Both these figures are based on all types of wards, and are higher than the figure of 0.43 per 100 bed days for all aggression found during this study of acute wards only. A recent study of absconding cites mean rates of 0.57 per 100 bed days on 15 acute admission wards prior to the use of an anti-absconding intervention (Bowers, Simpson, & Alexander, 2005), this being at least four times higher than the rate during this study. The study district, although being an inner city service, appears to have lower rates of aggression and absconding, lower rates of the use of special observation by nurses, and slightly higher than average rates of admission.

In order to interpret the findings, the limitations of our analytic strategy need to be understood. The selection of significantly associated variables and their building into explanatory models is a process likely to over-identify or exaggerate the power of the variables included. Such models are therefore primarily offered as a basis for further research and subsequent confirmation, rather than as firm findings in their own right. Nevertheless, some gross and substantive patterns are visible in the data, and these are more likely to be generalisable than the finer grained specific associations reported. The second utility of such modelling exercises is that they suggest new theoretical insights. In both these senses our findings have some clear lessons for the practice of acute psychiatry.

The findings display a clear link between admissions and adverse incidents, particularly male admissions, but perhaps also younger admissions and admissions of those with a psychotic disorder. There has been some controversy about the issue of gender and the disruptive behaviour of inpatients, with some studies finding no difference (Bowers, Simpson, & Alexander, 2003) and others finding that male patients are involved in more violent incidents (Pearson M, Wilmot E, & Padi M, 1986) and absconding (Bowers, Jarrett, Clark, Kiyimba, & McFarlane, 2000). More recently, findings have been published showing that although the number of violent incidents by inpatients is similar, male community patients tend to be more violent than females (Krakowski & Czobor, 2004). Due to the nature of our data, we are unable to say that it is the recently admitted men who are the perpetrators of the incidents that have been recorded. This is likely, because most adverse incidents occur during the early stages of an admission (Nijman, Merckelbach, Evers, Palmstierna, &

Campo, 2002). However it is also possible that increased male admission rates have a disturbing influence on those patients already on the ward, raising anxiety through a heightening of unpredictability; or that they stretch the ability of the staff to provide care and support to all patients, thus precipitating adverse incidents.

These same two mechanisms may in part explain the link between adverse incidents of different types. Although some of this association is possibly due to the same patient being involved in more than one incident type in the course of a week (Bowers et al., 2003), this may not be the whole story. Again it seems likely that adverse incidents have an impact on the ward as a community. Perhaps they prompt further incidents from others by introducing an element of stress and uncertainty into the social environment of the ward, or by occupying staff time, or by provoking 'copycat' events in some form of chain reaction. Certainly, patients report absconding from psychiatric wards in response to disruptive or disturbing events (Bowers, Jarrett, Clark, Kiyimba, & McFarlane, 1999).

The importance of nursing staff availability is the third consistent finding that emerges from the modelling exercise. The use of temporary bank and agency staff has previously been blamed for increases in incident rates on a psychiatric intensive care unit (James, Fineberg, Shah, & Priest, 1990). Our data suggest that it is not the use of temporary staff *per se*, but the total absence of regular staff through a diverse range of factors: vacancies, sick, study, annual and maternity leave. There has always been much discussion about appropriate nurse staffing levels in acute psychiatry, and although there have been findings linking adequate nurse staffing to positive care outcomes in general hospitals (Needleman, Buerhaus, Mattke, Stewart, & Zelevinsky,

2002), we do not know of any previous evidence demonstrating the importance of regular staff presence for the safety of patients and other staff. The 24 hour presence of nursing staff is one of the mechanisms through which acute care functions, providing scope for continuous assessment, monitoring and supportive relationships (Bowers, 2005).

In most respects, serious untoward incidents follow a similar pattern to other adverse incidents: high levels of admissions (in the week before and the week of the SUI) and other incidents (non SUIs) prompt their occurrence. Perhaps of particular note is the large significant relationship between a physically aggressive SUI and property damage, suggesting that events where patients break the furniture or fittings of a ward need to be managed swiftly and competently to minimise any escalation of disturbance.

Our findings suggest new ways to predict and prevent adverse incidents, including SUIs. Firstly wards need to be fully staffed with a zero vacancy factor, and staff need to be managed so that the demands of annual and study leave are spread evenly across the year. Both strategies would reduce the occurrence of periods of staffing crisis where few regular staff are available. However, it has to be acknowledged that exercising such control over staff holidays and other commitments does run counter to requirements to permit flexible working and hence the retention of staff (Sainsbury Centre for Mental Health, 2000). Secondly, the link between admissions/incidents and further incidents suggests that when there is a period of unusual patient turnover on a ward, or when there is an officially reported incident, wards should be provided with extra numbers of experienced qualified nursing staff for a period, over and above their

establishment figures, with a view to suppressing the opportunity for further adverse incidents or SUIs to occur. Other potential solutions involve the deployment of additional 'visiting' staff from other professions or teams, or other creative ways of increasing the staffing resources (and expertise) available to the ward at such times. Alternatively, the current pressure for acute admission beds (Ford, Durcan, & Warner, 2005) could be relieved by the provision of alternative services or additional capacity, thus reducing the risk of periods of rapid and intense patient turnover that appear to contribute to incidents.

It is worthy of note that recent changes to pay and conditions for nurses (Agenda for Change Project Team, 2004) have resulted in more annual leave for ward staff, without any provision being made for funding increased staffing numbers to fill the gap that has been created. Acute psychiatric inpatient services are also currently faced with demanding requirements to train all staff in race equality (Department of Health, 2005), resuscitation (National Institute for Clinical Execellence, 2005), dual diagnosis (Department of Health, 2003), acute inpatient psychiatry as a speciality (Clarke, 2004), and manual restraint (National Institute for Mental Health in England, 2004). In addition, investment in acute inpatient services has significantly decreased over the past five years, with reductions of 4.7% in acute bed numbers, and further reductions in investment projected (Appleby, 2004). Our findings suggest that these initiatives may have a cost in terms of adverse incidents and injuries, sometimes serious, to patients and staff.

These results are based on officially reported data, indicating that they should be accepted with some caution. Official data is subject to a number of different

influences (for example the concerns of managers and the constant changes in policy in the UK health service). Official statistics on violence are also said to be under-reported (Lion, Snyder, & Merrill, 1981). However, the fact that all incidents included were recorded by uniform reporting systems enhances the comparability of the data. Important and significant relationships were found between admission rates and incidents, incidents and further incidents, and regular staff availability and incident rates. These findings suggest that there are means for reducing incident frequencies based on service provision, staff management and deployment.

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The authors have no conflict of interest to declare.

Table 1. Rates of incidents, admissions and nursing workforce variables

		Ward week		100 bed days	
	n	Mean	Std. Dev.	Mean	Std. Dev.
Serious untoward incidents					
All	69	0.049	0.22	0.039	0.18
Absconds	21	0.015	0.13	0.012	0.10
Aggression	26	0.018	0.14	0.015	0.11
Self-harm	19	0.013	0.12	0.009	0.08
Other	3	0.002	0.05	0.001	0.04
All incidents					
All	1174	0.836	1.37	0.688	1.15
Physical aggression	370	0.263	0.65	0.216	0.56
Verbal aggression	226	0.161	0.51	0.135	0.41
Property damage	88	0.063	0.28	0.084	0.31
Self-harm	147	0.105	0.38	0.053	0.23
Absconds	238	0.169	0.50	0.142	0.42
Nursing workforce					
Bank and agency hours		275	98	224	91
Special observation hours		45	86	37	72
Total staff absence		358	102	298	119
				20 beds	
Admissions & discharges					
All admissions	5384	3.15	1.98	3.62	2.38
Male admissions	2802	1.79	1.49	2.06	1.79
Under 36 yrs of age admissions	2550	1.50	1.36	1.73	1.61
Psychotic admissions	2863	1.69	1.39	1.93	1.63
Ethnic minority admissions	3307	1.95	1.54	2.24	1.84
Substance using admissions	848	0.50	0.86	0.58	1.02
All discharges	5552	3.25	2.10	3.72	2.49

Table 2. Incident rate ratios (IRR) for each serious untoward incident model

Dependent variable		All	Absconds	Aggression	Self-harm
Independent variables IRR (95%CI)	Lag 1 week male admissions	1.17 (1.01,1.35)			1.37 (1.08,1.74)
	Under 36 admissions	1.17 (1.01,1.37)			
	Lag 2 week psychotic admissions	0.78 (0.64,0.96)			
	All admissions		1.28 (1.06,1.53)		
	Verbal aggression		1.67 (1.28,2.17)		
	Property damage			2.46 (1.29,4.7)	

Table 3. Incident rate ratios (IRR) for all incident models

Dependent variable		All incidents	Physical aggression	Verbal aggression	Deliberate self harm	Property damage	Absconds
Independent variables IRR (95% CI)	Male admissions	1.12 (1.05,1.21)				1.15 (1.01,1.31)	
	Lag 1 week male admissions	1.12 (1.04,1.21)	1.2 (1.08,1.34)				
	Lag 2 weeks male admissions	1.08 (1.01,1.16)					
	Psychotic admissions			1.1 (1.01,1.19)			
	Lag 1 week psychotic admissions						1.46 (1.15,1.86)
	Lag 1 week minority admissions						0.73 (0.58,0.92)
	Lag 2 weeks subs. use admissions					0.65 (0.46,0.91)	
	Physical aggression			1.45 (1.27,1.66)	1.37 (1.04,1.8)	1.39 (1.10,1.76)	1.64 (1.31, 2.06)
	Verbal aggression		1.60 (1.21,2.13)			1.48 (1.26,1.75)	1.67 (1.30,2.16)
	Deliberate self harm					1.54 (1.13,2.1)	
	Property damage			1.85 (1.43,2.4)			
	Absconds		1.46 (1.01, 2.11)				
	Observation hours						1.11 (1.02,1.2)
	Total staff absence	1.11 (1.06,1.16)	1.10 (1.02,1.19)		1.22 (1.11,1.34)		
	All discharges	1.05 (1.0,1.11)			1.14 (1.01,1.28)		
	Season_2	0.84 (0.64,1.11)					
	Season_3	0.80 (0.60,1.06)					
	Season_4	1.39 (1.01,1.88)					

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