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Junior staffing changes and the temporal ecology of adverse incidents in acute psychiatric wards

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Abstract

Title. Junior staffing changes and the temporal ecology of adverse incidents in acute psychiatric wards.

Aim. This paper reports an examination of the relationship between adverse incident rates, the arrival of new junior staff on wards, and days of the week on acute psychiatric wards.

Background. Incidents of violence, absconding and self-harm in acute inpatient services pose risks to patients and staff. Previous research suggests that the arrival of inexperienced new staff may trigger more adverse incidents. Findings on the relationship between incidents and the weekly routine are inconsistent.

Method. A retrospective analysis was conducted of formally reported incident rates, records of nursing student allocations and junior doctor rotation patterns, using Poisson Regression. Variance between days of the week was explored using contingency table analysis. The data covered 30 months on 17 psychiatric wards, and were collected in 2002–2004.

Findings. The arrival of new and inexperienced staff on the wards was not associated with increases in adverse incident rates. Most types of incidents were less frequent at weekends and midweek. Incident rates were unchanged on ward-round days, but increased rates were found on the days before and after ward rounds.

Conclusion. Increased patient tension is associated with raised incident rates. It may be possible to reduce incident rates by moderating stimulation in the environment and by mobilizing support for patients during critical periods.

Keywords: absconding, aggression, document analysis, inpatients, mental health nursing, self-harm, suicide, violence

Introduction

Adverse incidents on acute inpatient wards are a cause for concern. Assaults can cause physical injuries to staff and patients, and lower level aggression is associated with stress and sickness (Carmel & Hunter 1989, Needham *et al.* 2005).

Self-harm by patients is injurious by definition and can, less frequently, lead to the death of the patient (Proulx *et al.* 1997). The inpatient suicide rate in England is 0.14%, or one for every 714 admissions (Powell *et al.* 2000). The number of suicide attempts exceeds the number of completed suicides by a factor of 10 (Brunnenberg & Bijl 1998). Absconding is

associated with suicide and other negative outcomes (Niskanen 1974, Crammer 1984, Sundqvist-Stensman 1987, Bowers *et al.* 1999a). Any information we can learn about the contributory causes of such incidents is important, as it may enable us to devise strategies to reduce their frequency.

Background

Previous studies of aggression in psychiatry have suggested that new staff members may experience more anxiety in their first weeks and months working in psychiatry. This is the case, for instance, with junior doctors who appear to prescribe higher levels of sedating drugs to patients (Appleton 1965). Nursing students have also been reported to be particularly vulnerable to being assaulted by patients (Hodgkinson *et al.* 1984), and their presence has been associated with more frequent incidents of aggression (Tam *et al.* 1996, Owen *et al.* 1998), although this has not been uniformly found, with one study even showing lower risks for students (Rix & Seymour 1988). Findings on the weekly distribution of aggressive incidents are similarly varied, with some studies reporting lower rates at weekends (Cooper *et al.* 1983, Larkin *et al.* 1988, Carmel & Hunter 1989, Noble & Rodger 1989, Walker *et al.* 1994, Rasmussen & Levander 1996, Gudjonsson *et al.* 1999), others reporting average rates at weekends (Stockman & Heiber 1980, Depp 1983, Ionno 1983, Cooper & Medonca 1991, Nijman *et al.* 1997, Grassi *et al.* 2001, Soliman & Reza 2001), and two reporting the lowest rates on Saturday and the highest on Sunday (Dooley 1986, Coldwell & Naismith 1989). In one of these studies, an association was found between ward round days and aggressive incidents (Cooper *et al.* 1983).

There is little information on the weekly distribution of self-harm incidents, although there is one report of no difference by day of the week (Nijman & a Campo 2002). We have been unable to find any study relating self-harm or absconding to nursing students or junior doctors. The weekly distribution of absconding has been the subject of varying reports, with peak rates being reported during the week by some studies (Kernodle 1966, Sommer 1974, Kleis & Stout 1991, Farragher *et al.* 1996, Walsh *et al.* 1998), some reporting peaks at weekends, especially forensic units (Cancro 1968, Swindall & Molnar 1985, Dolan & Snowdon 1994), and another reporting no difference by day of the week (Greenberg *et al.* 1994). Ward rounds occur when the consultant psychiatrist and the multidisciplinary team visit the ward to review patient care. One study has reported no relationship between ward rounds and absconding rates (Bowers *et al.* 2000).

The data we report here were collected as part of a larger study which was a multi-method longitudinal investigation of links between adverse incidents and staff factors. Our previous research suggests that staff factors have a strong influence on rates of adverse incidents. These factors are the degree to which staff positively value patients, their ability to regulate their own emotional reactions of anger and fear towards patients, and provision of an effective structure of rules and routines for patient conduct (Bowers 2002). Intervention studies based on this model are proving successful (Bowers *et al.* 2003, 2005a, 2006a). The Tompkins Acute Ward Study has the dual purpose of testing this working model using a longitudinal design, and elaborating it through the discovery any additional staff related factors that may influence adverse incident rates.

Previous papers from this study have described the nature and purpose of acute wards (Bowers *et al.* 2005b), multidisciplinary working, the role of the Occupational Therapist (Simpson *et al.* 2005), and the relationship of adverse incidents to patient flow, and aggression related training (Bowers *et al.* 2006b, Bowers *et al.* in press). The findings reported in these papers are that adverse incidents are linked to other incidents (in a positive feedback loop), rises in patient throughput (numbers of admissions) and regular nursing staff absence (a combined measure of holiday, sickness, study leave and vacancy rates). Training nurses in the prevention and management of violence and aggression was not found to diminish adverse incidents, and one type of training was instead found to stimulate aggressive behaviour by patients.

The study

Aims

The aims of the study were

- (1) To examine the relationship between junior staffing changes (doctors and nursing students) and adverse incidents.
- (2) To explore the distribution of incidents over the working week, and their relationship to ward round days (days on which the consultant psychiatrist and other members of the multidisciplinary team meet on the ward to review all cases and take decisions on future care).

Design

A retrospective analysis was carried out of officially collected records of adverse incidents, nursing student placements, and junior doctor rotation patterns.

Sample

Data were drawn from formal reporting systems of one NHS organization in London, UK. Fourteen acute psychiatric wards and three psychiatric intensive care units (PICUs) on three hospital sites were included in the sample. One was a women-only ward, a second acted as an assessment ward, and the remainder were mixed sex wards serving a specific locality. The total period covered by the data was from 2002 (week 14) to 2004 (week 45), i.e. approximately two and a half years. The mean rate of admissions during this period was 3.15 per ward per week; 57% of these patients were men, the mean age was 36 years ($SD = 11.3$, range 16–71) and 54% had a psychotic disorder. Most included wards had 18 beds, and were staffed by a combination of registered psychiatric nurses and healthcare assistants. The whole-time equivalent staffing numbers were one staff member to one bed. Numbers of nursing staff on duty did not vary systematically over the course of the week. All wards were in one NHS trust, and staffing and skill mix were consistent across wards.

Data collection

Data on adverse incidents are routinely collected by nursing reports, which are entered on a proprietary computer system. We were provided with the dates of all adverse incidents falling into the following categories: verbal abuse, property damage, physical assault, self-harm and absconding. One hospital only began using this recording system in 2003 (week 36), and so for six wards in our sample these data were slightly less comprehensive. For the remaining 11 wards, data covering the full study period were available, and the resulting dataset covered 1778 ward weeks. Data on admissions and discharges is routinely collected in the study district, and this was provided for the study in an anonymous format. Data were available for the full study period on 1979 ward weeks.

Nursing student allocations to the wards, with dates, during the study period were collated from centrally held records at the relevant school of nursing, and included 546 student allocations to wards. Ward round days on each ward were identified by contacting each ward and requesting this information (during spring 2005). Junior doctor rotation dates were obtained in a similar fashion, and included 134 fresh allocations to wards.

Ethical considerations

The study was approved by the Local Research Ethics Committee and access to the data was provided by the NHS organizational managers.

Data analysis

Tables and graphs of incidents by days of the week were prepared using SPSS v11.5. Chi-squared tests were used to identify statistically significant differences. In order to test for the effect of ward round days, incident rates on ward-round days were compared with incident rates on non-ward-round weekdays. For this analysis, data from 2004 only were used, as ward round days were subject to change over time. All these tests on the weekly distribution of incidents used data from both acute wards and PICUs. The occurrence of public holidays was ignored in these analyses, as there were too few for meaningful statistical analysis.

The data was screened for outliers and obvious errors, which were checked against other sources of information and/or removed. All data were then imported into a database program and collated using structured query language (SQL). The data were then exported as text files and imported into STATA 8 (Stata corporation 2003) for statistical analysis. The basic form of this data was incident and new staff (junior doctors and nursing students) counts by week by ward. Poisson regression was used, as this is particularly appropriate for the analysis of event counts over time. The number of occupied bed days was used as the exposure variable as this allowed for different ward sizes and occupancy rates. The effect of new staff on incidents was assessed by regressing lags of new staff on counts of incidents. Following initial analysis, each least significant variable was then removed sequentially, until only statistically significant variables ($P < 0.05$) were in the model. Adjusted r -squared values were calculated for each model, and incident rate ratios provided as a guide to effect sizes. 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 a 50% increase in incidents. For these analyses, only data from the 14 acute wards were used.

Validity and reliability

Although formally reported data on adverse incidents are known to be subject to under-reporting, this is likely to be at a uniform rate within one NHS trust operating to fixed definitions. Formally reported incidents have been widely used in this type of retrospective analysis (Noble & Rodger 1989, Shah 1997, Walsh *et al.* 1998).

Findings

Junior doctor rotations

Of the 134 fresh allocations of junior doctors to the wards, all were of two doctors and followed a regular pattern of change (rotation) every 6 months. The 6 weeks following the arrival of new junior doctors on the wards, plus the week when they arrived, were tested for their impact on different types of adverse incidents. Following the arrival of junior doctors, physical aggression decreased in week 3 (IRR = 0.65, $r^2 = 0.003$, $P = 0.036$) and absconding decreased in week 3 (IRR = 0.56, $r^2 = 0.004$, $P = 0.048$); there was no change in verbal aggression, property damage, or self-harm.

Nursing student allocations

Of the 546 fresh allocations of students to wards, 124 were of one student, 77 of two students, 56 of three students, 21 of four students and four of five students. The 6 weeks following the arrival of new nursing students on the wards, plus the week in which they arrived, were tested for their impact on different types of adverse incidents. Following the arrival of students, physical aggression decreased in the following week (IRR = 0.82, $r^2 = 0.004$, $P = 0.014$); there was no change in verbal aggression, property damage, absconding or self-harm.

Days of the week

The distributions of incidents by days of the week are displayed in Table 1. Self-harm did not vary by day of the week, nor did verbal aggression. However, property damage was less frequent on Wednesdays and Fridays, and all incidents counted together were less likely at weekends. Further testing showed that weekend incident rates were significantly different from weekday rates ($\chi^2 = 10.96$,

d.f. = 1, $P = 0.001$), but not that Wednesdays were different from other weekdays ($\chi^2 = 1.5$, d.f. = 1, $P = 0.221$). There were also trends for physical aggression to be lower at the weekends and midweek, and for absconding to peak on Thursdays and Fridays.

Ward-round days

At ward rounds decisions are made that are sometimes unpalatable to patients, e.g. refusals to grant leave or discharge, or to increase doses of unwanted medication. Absconding was no more or less likely to occur on ward round days ($\chi^2 = 0.045$, d.f. = 1, $P = 0.832$). The same was the case for physical aggression ($\chi^2 = 0.447$, d.f. = 1, $P = 0.504$), property damage ($\chi^2 = 0.039$, d.f. = 1, $P = 0.760$), self-harm ($\chi^2 = 1.445$, d.f. = 1, $P = 0.229$), verbal aggression ($\chi^2 = 0.422$, d.f. = 1, $P = 0.516$), and all incidents counted together ($\chi^2 = 0.352$, d.f. = 1, $P = 0.553$).

A total of 31 ward rounds per week occurred across the sample wards, with two on a Monday, 11 on a Tuesday, four on a Wednesday, nine on a Thursday and five on a Friday. This uneven distribution makes it difficult to compare the distribution of adverse events, as any pattern of association (on non-association) may be due to other facets of the way the working week is organized. The results of the comparison are presented in Table 2. Incidents were more likely on the days before and after ward rounds. These effects were most pronounced for aggressive behaviours, and a non-statistically significant trend was seen for absconding, self-harm and property damage.

Discussion

The general decrease of incidents at the weekend on acute wards confirms some previous work (Cooper *et al.* 1983, Larkin *et al.* 1988, Carmel & Hunter 1989, Noble & Rodger 1989, Walker *et al.* 1994, Rasmussen & Levander 1996,

Table 2 Ward rounds and incidents: number of incident days by type of day

Type of day	Absconds		Physical		Property		Self-harm		Verbal		All incidents	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
No proximate ward round	3	447	9	441	2	448	6	444	3	447	25	425
Day before	16	839	43	812	8	847	12	843	16	839	108	747
Ward round	21	1419	64	1376	9	1431	12	1428	24	1416	142	1298
Day after	11	664	38	637	5	670	8	667	19	656	91	584
Day after and day before	3	177	6	174	2	178	4	176	9	171	27	153
Chi-square (d.f. = 4)	3.04		9.78		1.60		3.65		15.72		25.19	
P-value	0.551		0.044		0.089		0.455		0.003		<0.001	

Gudjonsson *et al.* 1999), and requires some explanation. At the weekends there is less pressure on patients to get out of bed at an early hour, and there may be fewer group and individual activities that patients are pressured to join at weekends. It might be argued that expectations are lower for patients at weekends, and that there is less pressure on them to do anything that they might find unpalatable, thus reducing conflict with staff. Alternatively, it might be argued that there are fewer patients on the wards at weekends because many are on leave. However, it is the more able and less symptomatic patients who are given leave rather than those who are judged to be at high risk of harming themselves or others.

Psychiatric symptoms are a commonly invoked explanation for aggressive behaviour by patients, for example command hallucinations. Yet the decline in aggression at weekends suggests that symptoms alone are not a sufficient explanation. We are not aware of any evidence, for example, that psychotic symptoms subside at weekends, but physical assaults on wards are fewer in number. It would seem that, just as for absconding (Bowers *et al.* 1999b), although symptoms may be involved, they do not fully explain the decline in aggression at weekends.

It may be that weekends provide a less stimulating and anxiety-provoking social environment for disturbed patients. There are fewer new admissions, fewer official visitors (manager and clinicians of various disciplines), fewer telephone calls to the staff, and no formal meetings. As a result, wards are literally quieter and nursing staff are more available to interact with patients. There may be a substantial amount of activity, for example weekend cleaning, baths, recreational endeavours, but this will involve only nurses and patients, and there will be fewer patients (due to leave). This generally relaxed atmosphere may be enhanced by expectations about the weekly rhythms of life and the use of weekends for pleasurable, self-indulgent activities. A similar theory has been advanced by Vittengl (2002) to explain the lower use of seclusion and mechanical restraint at weekends. He argued that greater demands on patients during weekdays increased stress and therefore negative behaviour. Alternatively, it may be that lower stimulation and stress levels at weekends directly reduce the acuity of psychotic symptoms, thus reducing adverse incidents (Nuechterlein & Dawson 1984).

Either way, these findings suggest that we should seek ways to import these attributes of weekends into weekdays to reduce adverse incidents. It may be possible to reduce noise on the ward, limit visits by clinicians and managers, and hold meetings in an area separated from the ward, for example. Alternatively, the ward might be declared closed for periods

of time during the week, as is already being tried in some places (Kent 2005).

By themselves, such explanations might be considered speculative, but they are supported by the relationship of incidents to ward rounds. While the initial analysis of ward round days showed no effect on incident rates, the more detailed analysis of days prior to and after ward rounds did demonstrate raised rates of absconding and aggressive behaviours. This suggests that anticipatory and postevent tensions may contribute to raised incident rates, a theory that has been previously advanced by others (Cooper *et al.* 1983). Alternatively, it may be that incidents the day before are indirect patient attempts to influence decisions made on the day itself, and that incidents the day after are reactions to decisions which have been made.

Staff stress and tension, however, do not appear to be so closely linked to increased incidents. We might expect that the arrival of new members of the ward team would cause heightened anxiety. The new staff would themselves be nervous about their roles and new environment, and existing staff might be concerned to provide closer supervision, assess the new team members and develop relationships with them. It may also be expected that newer staff would be less skilled in their interactions with patients and therefore evoke greater numbers of incidents, or that patients might experience greater anxiety when exposed to newer and incompletely trained staff. Yet none of these factors seemed to have an impact on incident rates. The statistically significant findings found pointed in the direction of lowered incident rates, and might in any case have been the spurious false positive findings that occur when multiple statistical tests are conducted. However, if these findings are indications of a substantive effect, then they may indicate that new staff are more caring, sensitive, and keen to respond to patients' needs, thus reducing the number of adverse incidents.

The variability of previously reported findings on the weekly variation of adverse incidents suggests that our findings may only be locally valid. However, the cause of that variability may be setting and service differences, as much of the previous work took place in the United States of America (USA) and/or in secure forensic psychiatric hospitals. There is only one previously published study on the weekly variation in absconding rates from United Kingdom (UK) general acute psychiatric units, and this showed no variation by day (Bowers *et al.* 2000). In the field of aggressive behaviour, limiting the literature to studies of UK acute psychiatric wards means that there are only four previous studies, one of which reports no difference across the week (Soliman & Reza 2001), with the remainder reporting lower rates at weekends (Cooper *et al.* 1983, Noble & Rodger

What is already known about this topic

- Adverse incidents in psychiatric wards are injurious to patients and staff, but their causes are not fully understood.
- New staff (junior doctors and nursing students) experience anxiety when starting work on a new ward, and may be more at risk of violence from patients.
- The frequency of adverse incidents varies by day of the week, but the reasons for this are unknown.

What this paper adds

- The arrival of new staff on acute psychiatric wards was not associated with any change in the rates of adverse incidents.
- Adverse incidents are less frequent at weekends and more frequent on the days before and after ward rounds.
- It may be possible to reduce incident rates by moderating stimulation in the environment and by mobilizing support for patients during critical periods.

1989, Walker *et al.* 1994). Previous results from analogous UK services are therefore largely consistent with our findings.

This study found no evidence that new junior staff elicit more aggressive or other adverse incidents from patients. In contrast trends suggesting the opposite were found. Tension and raised anxiety among patients appears to be linked to greater adverse incident rates, particularly aggression. This is visible in pre- and postweek, and pre- and postward round raised incident rates. These tensions appear to have a larger impact on incident rates than symptoms alone, as incidents rates were very low at weekends. The link between stress on the ward community and adverse incidents is also supported by our other findings on admission rates and staff availability (Bowers *et al.* 2006a).

Study limitations

The main limitation of this study is that it was based on official records of adverse incidents, and such sources are known to be incomplete and perhaps subject to bias due to different thresholds for reporting on different wards. However, the use of official records meant that a large longitudinal data set could be easily accessed. Such large data sets are difficult to achieve using standardized research measures, for reasons of expense, and because long-term collaboration by staff in data collection is problematic.

Conclusion

Concerns about heightened risk of adverse incidents at times of new staff influxes to acute psychiatric wards seem to be misplaced. It may be possible to reduce incident rates by moderating stimulation, change and uncertainty in the patient environment, and by mobilizing nursing support for patients at times of higher stress. Further research is required on the social and contextual causes of adverse incidents on acute psychiatric wards.

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Author contributions

LB was responsible for the study conception and design and drafting of the manuscript. DJ and CD performed the data collection and LB and AS performed the data analysis. LB and HN obtained funding and CD provided administrative support. DJ, AS and JW made critical revisions to the paper. LB supervised the study.

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