

Overcrowding in psychiatric wards and physical assaults on staff: data-linked longitudinal study

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Background

Patient overcrowding and violent assaults by patients are two major problems in psychiatric healthcare. However, evidence of an association between overcrowding and aggressive behaviour among patients is mixed and limited to small-scale studies.

Aims

This study examined the association between ward overcrowding and violent physical assaults in acute-care psychiatric in-patient hospital wards.

Method

Longitudinal study using ward-level monthly records of bed occupancy and staff reports of the timing of violent acts during a 5-month period in 90 in-patient wards in 13 acute psychiatric hospitals in Finland. In total 1098 employees (physicians, ward head nurses, registered nurses, licensed practical nurses) participated in the study. The outcome measure was staff reports of the timing of physical assaults on both themselves and ward property.

Results

We found that 46% of hospital staff were working in overcrowded wards, as indicated by >10 percentage units of excess bed occupancy, whereas only 30% of hospital personnel were working in a ward with no excess occupancy. An excess bed occupancy rate of >10 percentage units at the time of an event was associated with violent assaults towards employees (odds ratio (OR)=1.72, 95% CI 1.05–2.80; OR=3.04, 95% CI 1.51–6.13 in adult wards) after adjustment for confounding factors. No association was found with assaults on ward property (OR=1.06, 95% CI 0.75–1.50).

Conclusions

These findings suggest that patient overcrowding is highly prevalent in psychiatric hospitals and, importantly, may increase the risk of violence directed at staff.

Declaration of interest

None.

Violence in psychiatric healthcare is a serious concern because of its high prevalence and its likely adverse effects on the health of employees and the quality of psychiatric care.^{1,2} Overcrowding in wards is another well-known problem in psychiatric hospitals worldwide resulting, in part, from the dramatic decline in psychiatric in-patient beds during past decades.^{3–7} It typically arises when there is shortage of beds in relation to need or when acute beds are 'blocked' by individuals who no longer need hospital care but for whom suitable community support is not available. Patient overcrowding has been hypothesised to increase the risk of violence in psychiatric settings, but previous studies have been small in scale, ranging between one to two psychiatric units,^{8–13} or conducted at the hospital level as opposed to the ward level.¹⁴ Some studies have shown that more violent incidents occur in the unit when the numbers of patients is high.^{10,11,13} However, null findings^{8,9,12} and even the opposite result,¹⁴ whereby patient overcrowding is related to a lower risk of violence, have also been reported. Furthermore, earlier studies have focused on the occurrence of violence in general without specifying whether it is targeted towards hospital personnel, other patients, or the environment and equipment.

To examine the association between patient overcrowding and violent assaults on staff, we collected monthly bed occupancy records for 90 psychiatric in-patient wards in 13 hospitals providing specialised acute psychiatric care in Finland. More than 1000 physicians and nurses reported whether they were assaulted and the timing of violent assaults carried out by patients. These data were linked to the bed occupancy record over a period of 5 months.

Method

Participants

This study is a part of the Finnish Public Sector Study,^{15,16} which is coordinated by the Finnish Institute of Occupational Health and approved by its ethics committee. A questionnaire was mailed to all employees ($n=1493$) either in May 2004 or November 2004. Of the eligible employees, 1102 (74%) responded to the survey. Survey responders were then linked to bed occupancy data on 90 acute psychiatric bed wards in 13 psychiatric hospitals. We selected from the respondents the 1098 employees (99.6%) who had been working at that hospital for at least a 1 month at the time of the survey.

Study context and procedure

In Finland, specialised psychiatric hospital care is organised into 20 hospital districts. Most of the in-patient wards serve individuals with acute psychiatric problems aged 18 to 65 and a minority of the wards offer treatment for people over 65 years of age. The most common diagnostic group is ICD-10¹⁷ F20–F29 (schizophrenia, schizotypal and delusional disorders), accounting for 57% of all patient days in psychiatric hospital care, followed by F30–F39 (mood disorders, e.g. depression), accounting for 22% of patient days.¹⁸ The treatment on the wards consists of differential diagnostic psychiatric and medical examinations, safety measures, psychosocial support with psychoeducative, cognitive-behavioural and family approaches and biological interventions including mostly medication and sometimes electroconvulsive therapy.

Occupational therapy, physiotherapy and group activities may also be included.

In the present study, all 90 in-patient wards in 13 psychiatric hospitals in five hospital districts were included. Participating hospitals routinely collect monthly figures on bed occupancy for each ward according to the procedure set by the National Institute for Health and Welfare. Bed occupancy is calculated as the ratio between the sum of in-patient days and the number of beds available (i.e. the number of beds × the number of days the ward is in use), and expressed as a percentage. Ward closure days are excluded from the denominator. The day of admission but not the day of discharge for each person is included in the numerator.^{15,16} The rate above which a hospital ward is considered overcrowded is usually defined as >85%.^{15,16,19,20} Three groups of excess bed occupancy were formulated ≤5 percentage units; >5 to ≤10 percentage units; and >10 percentage units, as in previous studies.^{15,16} In this study, ward-level monthly rates of bed occupancy between January 2004 and November 2004 were considered.

We included bed occupancy months during which the employee was present (i.e. not on vacation, sick leave etc.) for at least 15 days. For every month, the ward in which the employee was working was checked to ensure that the employees were assigned to the correct bed occupancy ‘exposure’. For each employee, only the month during which the event occurred defined the exposure category for the event, and the reference group (no event) was all months for each employee during which the event did not occur (see Fig. 1 for an illustration of the study design for a hypothetical employee).

In the survey, details of violent assaults at work were requested retrospectively by asking whether the respondent had encountered any of the listed violent incidents at work (physical violence, being threatened with a weapon or violence towards ward property) and how often those incidents happened with response alternatives: 1, never; 2, not every year; 3, 1–2 times a year; 4, 1–3 times a month; 5, at least weekly. In addition, if an incident occurred during the survey year, the respondent was requested to report the month. Because the survey was implemented in May in 11 hospitals, the follow-up time for those hospitals included the first 5 months of the year. In two hospitals, the survey was implemented in November. To obtain an equal follow-up time for each hospital, we chose a follow-up time between June and November for those two hospitals (5 months plus 1 month’s summer break). Thus, the follow-up time for violent assaults for each employee was approximately 5 months, the last month being that of the survey. The assaults were categorised as physical assaults on an employee (physical violence for example kicking, hitting and threatening

with a weapon) and assaults on ward property (throwing objects, breaking objects etc.).

From employers’ registers we obtained information on gender, age at survey, occupation (physician, head nurse, registered psychiatric nurse, licensed practical psychiatric nurse), type of employment contract (temporary v. permanent), how many years’ work experience the employee had with the present employer (referred to here as length of job contract) (<1, 1–4, >4 years), hospital district, and specialty (adult v. child/adolescent). The sum of patient days is collected each month as part of the procedure used to calculate the bed occupancy rate. We used this ward-level monthly information in order to control for confounding caused by the number of patients treated on the ward (≤300, 301–500, >500 patient days). These registers covered all employees.

Statistical analyses

We used repeated measures logistic regression with the generalised estimating equations²¹ method with an exchangeable correlation structure to examine the associations between monthly bed occupancy and employee reports of violence at work. This method takes into account intra-individual correlation. As in previous studies, we constructed a measure of excess occupancy, with bed occupancy ≤85% coded as 0% and bed occupancy >85% coded as the percentage occupancy minus 85%.^{15,16} Monthly excess bed occupancy rates and the number of patient days were used as time-dependent exposures that may change in value over the period of observation.²² Each employee was followed for 5 months. Odds ratios and their 95% confidence intervals were serially adjusted for potential confounding factors.

We ran two sensitivity analyses, the first one using data in which overcrowding was defined on the basis of 2 months instead of 1 month. This was because when exposure to overcrowding was determined monthly for employees present at least 15 days, participants whose violent assault occurred at the beginning of the month and subsequently were absent more than 15 days were excluded, resulting in a possible bias due to the healthy survivor effect. The second sensitivity analysis explored whether there was a significant interaction between psychiatric subspecialty (adult v. child/adolescent) and bed occupancy rate associated with assaults. The number of participants allowed us only to carry out a subgroup analysis for adult units. All analyses were conducted with SAS, version 9.2 for Windows statistical software.

Results

Of the 1098 participants, 30% were working in a ward with no excess bed occupancy, 10% in wards with excess occupancy of ≤5 percentage units, 14% in wards with excess occupancy of >5 to 10 percentage units and 46% in highly overcrowded (>10 percentage units) wards (Table 1; see online Table DS1 for a more detailed version). At the ward level, 41 wards (46%) were highly overcrowded at the beginning of follow-up. Men were more likely than women to be working in high-occupancy wards, but the age of the participant was not related to the bed occupancy rate. Physicians and ward head nurses were more often working in no-excess hospital wards, whereas practical psychiatric nurses were more likely to be working in high-excess occupancy wards. Those with 1 to 4 years’ experience with the current employer were working more often in low-excess wards whereas those with more than 4 years were working in highly overcrowded wards. There was a large variation in bed occupancy between the hospital districts (online Table DS1). In total, 95% of the participants working in wards with >10 percentage units excess were from units for adults and only 5% were from units treating children

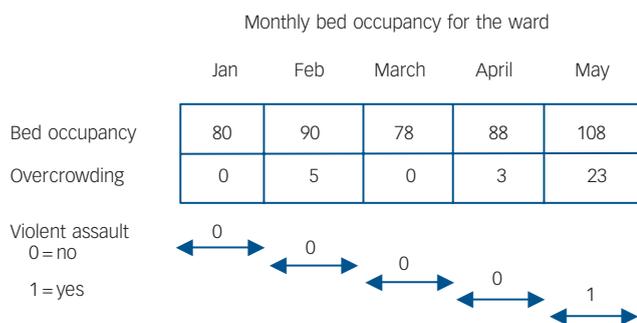


Fig. 1 Study design for a hypothetical employee. The incident (violent assault) occurs during the survey month when the overcrowding rate is 23 percentage units.

Table 1 Individual staff characteristics, organisational characteristics and bed occupancy rates in the psychiatric hospital wards at the beginning of follow-up (for a more detailed version see online Table DS1)

Characteristic	Excess bed occupancy at the psychiatric hospital ward, <i>n</i> (%)					<i>P</i> ^a
	Total	No excess	Excess ≤5%	Excess 5–10%	Excess >10%	
Sample size	1098	328	111	149	510	
Gender						<0.001
Female	755 (69)	249 (76)	77 (69)	112 (75)	317 (62)	
Male	343 (31)	79 (24)	34 (31)	37 (25)	193 (38)	
Age						0.67
20–29	152 (14)	43 (13)	17 (15)	19 (13)	73 (14)	
30–39	274 (25)	92 (28)	30 (27)	41 (28)	111 (22)	
40–49	374 (34)	112 (34)	36 (32)	46 (31)	180 (35)	
50–63	298 (27)	81 (25)	28 (25)	43 (29)	146 (29)	
Occupation						<0.001
Physician/ward head nurse	136 (12)	50 (15)	18 (16)	15 (10)	53 (10)	
Registered psychiatric nurse	500 (46)	173 (53)	55 (50)	69 (46)	203 (40)	
Licensed practical psychiatric nurse	462 (42)	105 (32)	38 (34)	65 (44)	254 (50)	
Type of job contract						0.37
Permanent	907 (83)	262 (80)	91 (82)	128 (86)	426 (84)	
Temporary	191 (17)	66 (20)	20 (18)	21 (14)	84 (16)	
Length of job contract (years)						<0.001
<1	381 (35)	109 (33)	57 (51)	68 (46)	147 (29)	
1–4	463 (42)	171 (52)	35 (32)	56 (38)	201 (39)	
>4	254 (23)	48 (15)	19 (17)	25 (17)	162 (32)	
Specialty						<0.001
Adults	856 (78)	201 (61)	72 (65)	101 (68)	482 (95)	
Children/adolescents	242 (22)	127 (39)	39 (35)	48 (32)	28 (5)	
Ward size (patient days, <i>n</i>) ^b						<0.001
≤300	321 (29)	229 (70)	46 (41)	23 (15)	23 (5)	
301–500	393 (36)	58 (18)	63 (57)	77 (52)	195 (38)	
>500	384 (35)	41 (13)	2 (2)	49 (33)	292 (57)	

a. *P* for heterogeneity in χ^2 test.

b. As indicated by the sum of patient days during the month at the beginning of follow-up.

and adolescents. The number of patient days was related to the bed occupancy rate: a high number of treated patients was associated with higher bed occupancy rate, as expected.

Of the respondents, 15% reported they had not directly encountered physical violence, 30% indicated they had but less than yearly, 31% indicated 1 to 2 times a year, 16% 1–3 times a month, and 8% at least once a week. Similarly, 63% reported that they had not been threatened with a weapon, 29% that they had but less often than yearly, 7% 1 to 2 times a year, 1% 1–3 times a month and 0% weekly. Finally, 6% responded that they had not witnessed violence towards ward property, 17% that they had but less often than yearly, 40% 1 to 2 times a year, 28% 1–3 times a month and 9% at least once a week (results not shown in the tables).

Older age was related to a lower probability of an employee being physically assaulted, whereas nurses had a 1.96-fold risk and practical nurses had a 2.19-fold risk when compared with physicians and ward head nurses (Table 2; see online Table DS2 for a more detailed version). There was some variation between the hospital districts, and assaults were also more frequent in wards with a high number of patient days. Men, younger employees, nurses and those working in child/adolescent units reported more assaults on ward property. There was also some variation between hospital districts with regard to assaults on property, and those incidents were more common in wards with a high number of patient days compared with those with a low number of patient days.

Excess bed occupancy of more than 10 percentage units was associated with a 2.60-fold risk of assault on an employee after adjustment for age and gender (Table 3). The association was

not attenuated after further adjustments for all potential confounding factors, the odds ratio being 1.72 in the final model. Excess bed occupancy of ≤5 and >5 to 10 percentage units were also associated with assaults on staff (OR = 1.91 and OR = 1.82). In the model adjusted for the age and gender of the respondent, excess bed occupancy was related to assaults towards ward property (OR = 1.79). However, the association attenuated after further adjustment for confounding factors.

Sensitivity analysis

As exposure to overcrowding was determined monthly for employees present at least 15 days, participants whose assault occurred at the beginning of the month and who subsequently were absent more than 15 days were excluded. To include these employees, we defined overcrowding on the basis of 2 months (mean rate of the month of the event and the preceding month). The findings were little changed (online Table DS3). The fully adjusted odds ratios for excess bed occupancy rates of ≤5, 5–10, and >10 percentage units for assaults on an employee were, 1.54 (95% CI 0.91–2.59), 1.69 (95% CI 1.01–2.81) and 1.80 (95% CI 1.10–2.94) compared with no excess bed occupancy, respectively. Associations with assaults on ward property were 0.71 (95% CI 0.46–1.09), 1.22 (95% CI 0.85–1.76) and 0.89 (95% CI 0.62–1.29).

The second sensitivity analysis is based on the notion of a significant interaction between specialty (adult *v.* child/adolescent) and overcrowding associated with violent assault towards staff ($P=0.008$ in Table 3, $P<0.001$ in online Table DS3). The interaction between specialty and bed occupancy rate associated with assaults towards ward property was $P=0.065$

Table 2 Univariate associations of individual staff characteristics and organisational characteristics with the onset of violent physical assaults reported by ward staff (for a more detailed version see online Table DS2)

Characteristic	Assaults on an employee			Assaults on ward property		
	<i>n</i>	Events, <i>n</i> (%)	OR (95% CI)	<i>n</i>	Events, <i>n</i> (%)	OR (95% CI)
All	1098	178 (16)		1089	264 (24)	
Gender						
Female	755	114 (15)	1.00	748	154 (21)	1.00
Male	343	64 (19)	1.24 (0.93–1.65)	341	110 (32)	1.57 (1.26–1.96)
Age						
20–29	152	31 (20)	1.00	151	51 (34)	1.00
30–39	274	59 (22)	1.04 (0.69–1.57)	273	78 (29)	0.82 (0.60–1.11)
40–49	374	53 (14)	0.66 (0.44–1.01)	369	85 (23)	0.64 (0.47–0.87)
50–63	298	35 (12)	0.54 (0.34–0.86)	296	50 (17)	0.46 (0.32–0.65)
Occupation						
Physician/head nurse	136	11 (8)	1.00	133	21 (16)	1.00
Registered psychiatric nurse	500	83 (17)	1.96 (1.07–3.61)	498	131 (26)	1.62 (1.05–2.50)
Licensed practical psychiatric nurse	462	84 (18)	2.19 (1.19–4.02)	458	112 (24)	1.51 (0.98–2.35)
Type of job contract						
Permanent	907	144 (16)	1.00	899	210 (23)	1.00
Temporary	191	34 (18)	1.15 (0.81–1.64)	190	54 (28)	1.26 (0.96–1.64)
Length of job contract (years)						
< 1	381	68 (18)	1.00	379	98 (26)	1.00
1–4	463	70 (15)	0.81 (0.59–1.11)	458	103 (22)	0.83 (0.64–1.07)
> 4	254	40 (16)	0.84 (0.58–1.21)	252	63 (25)	0.92 (0.69–1.23)
Specialty						
Adults	856	129 (15)	1.00	847	189 (22)	1.00
Children/adolescents	242	49 (20)	1.31 (0.96–1.79)	242	75 (31)	1.36 (1.07–1.73)
Ward size (Sum of patient days) ^a						
≤ 300	321	35 (11)	1.00	319	53 (17)	1.00
301–500	393	69 (18)	1.51 (1.01–2.25)	390	126 (32)	1.85 (1.36–2.51)
> 500	384	74 (19)	2.11 (1.43–3.11)	380	85 (22)	1.64 (1.19–2.27)

OR, odds ratio.

a. As indicated by the sum of patient days during the month at the beginning of follow-up.

($P=0.073$ in online Table DS3), thus being close to significant. Subgroup analysis was possible only for adult psychiatry, because of the small number of participants in child/adolescent psychiatry ($n=242$). In the employees in the adults' units, we found a strong association between overcrowding of >10 percentage units and violent assaults on staff, the odds ratios being 3.04 (Table 3) and 5.32 (online Table DS3) in the fully adjusted models. We also found a strong linear trend between higher occupancy and a higher probability of assault (P -values <0.001), suggesting a dose–response pattern. Subgroup analysis in adult units with assaults on ward property as an outcome revealed to a great extent similar (non-significant) findings to the analysis on the whole cohort (Table 3 and online Table DS3).

Discussion

Main findings

This longitudinal study of more than 1000 employees from 90 acute psychiatric hospital wards shows that overcrowding is a serious problem in Finnish acute psychiatric care. At the beginning of the follow-up, 46% of wards were highly overcrowded and of the employees, 46% were working in overcrowded wards. Moreover, our findings suggest that exposure to patient overcrowding in the hospital ward may be associated with an elevated risk of violent physical assaults by patients. We found evidence of a dose–response effect in adult psychiatric wards as well as in all wards across a 2-month observation period, showing increasing risk of violent physical assaults with increasing patient overcrowding. To our knowledge, this is the first study linking

patient overcrowding with increased risk of violent assaults on staff in acute psychiatric units.

Strengths and limitations

The strengths of our study include accurate measurement of overcrowding in relation to the timing of the event and a large sample size. Furthermore, we used bed occupancy data that were standardised and based on routinely recorded monthly assessments of bed occupancy in each ward. A potential problem in previous studies based on single units is that peaks in patient numbers result in higher numbers of employee reports of assaults even if the proportion of violent patients remains the same. In addition to inclusion of 90 different wards in the study, we addressed this problem by controlling for the number of patients treated during that month, as indicated by monthly recorded patient days in each ward. As expected, the number of patient days during the month was strongly related to assaults reported by ward staff. This indicates that a larger number of patients on the ward means more patients who can be violent and therefore a greater likelihood of staff-reported violence.

The association was robust to adjustment for the number of treated patients, as well as for several known confounding factors for physical assaults in psychiatric settings, such as employee characteristics and ward specialty. However, violence was more common in psychiatric wards for children and adolescents than in those for adults. The reasons behind this finding are not clear and need further research. The observed interaction between ward type (adult *v.* child/adolescent psychiatry) and overcrowding in predicting assaults on an employee revealed as high as a

Table 3 Association between ward bed occupancy rate and the onset of violent physical assaults reported by ward staff

	Assaults on an employee					Assaults on ward property				
	n ^a	Events, n (%)	Model A, OR (95% CI) ^b	Model B, OR (95% CI) ^c	Model C, OR (95% CI) ^d	n ^a	Events, n (%)	Model A, OR (95% CI) ^b	Model B, OR (95% CI) ^c	Model C, OR (95% CI) ^d
Bed occupancy rate, all wards	1098	178 (16)	1.00	1.00	1.00	1089	264 (24)	1.00	1.00	1.00
No excess occupancy ^e	453	30 (7)	2.27 (1.33–3.85)	2.21 (1.30–3.76)	1.91 (1.11–3.27)	450	60 (13)	1.46 (0.96–2.23)	1.40 (0.92–2.13)	1.22 (0.80–1.87)
Excess occupancy ≤ 5%	106	27 (25)	2.52 (1.53–4.14)	2.25 (1.36–3.73)	1.82 (1.08–3.07)	105	36 (34)	1.68 (1.14–2.47)	1.30 (0.88–1.93)	1.08 (0.71–1.63)
Excess occupancy 5–10%	172	32 (19)	2.60 (1.71–3.94)	2.20 (1.42–3.41)	1.72 (1.05–2.80)	170	44 (26)	1.79 (1.32–2.41)	1.29 (0.93–1.78)	1.06 (0.75–1.50)
Excess occupancy > 10%	367	89 (24)	<0.001	<0.001	0.045	364	124 (34)	<0.001	0.17	0.89
P for trend										
Bed occupancy rate, adult psychiatry	851	129 (15)	1.00	1.00	1.00	842	189 (22)	1.00	1.00	1.00
No excess occupancy ^e	350	14 (4)	2.32 (1.08–4.98)	2.39 (1.10–5.19)	2.03 (0.90–4.54)	347	32 (9)	1.30 (0.72–2.34)	1.49 (0.83–2.66)	1.31 (0.72–2.37)
Excess occupancy ≤ 5%	101	13 (13)	3.30 (1.63–6.67)	3.44 (1.71–6.95)	2.76 (1.32–5.77)	100	19 (19)	2.08 (1.26–3.44)	2.00 (1.21–3.31)	1.69 (1.01–2.82)
Excess occupancy 5–10%	101	19 (19)	4.20 (2.36–7.48)	4.30 (2.37–7.82)	3.04 (1.51–6.13)	99	31 (31)	2.15 (1.46–3.17)	1.75 (1.15–2.66)	1.28 (0.81–2.01)
Excess occupancy > 10%	299	83 (28)	<0.001	<0.001	<0.001	296	107 (36)	<0.001	0.006	0.30
P for trend										

OR, odds ratio.

a. At the end of follow-up.

b. Model A: adjusted for respondent's age and gender.

c. Model B: as model A + adjusted for respondent's occupation, type and length of job contract and hospital district.

d. Model C: as model B + adjusted for speciality and the monthly sum of patient days.

e. One-month bed occupancy of ≤ 85%.

threefold risk of violent assaults associated with overcrowding in adult psychiatry wards. However, because of the small number of employees in child and adolescent psychiatry wards we were not able to conduct a separate analysis in that specialty.

Randomised controlled trials are the best possible ways to demonstrate causality. However, in occupational settings they are not always feasible, and in psychiatric settings, an experimental approach with patients would be unethical. In our case, observational data probably provide the best source of evidence available. In our study, data were collected from five hospital districts each providing psychiatric care for a population ranging from 165 000 to 481 000; thus, the areas are relatively small. However, there is variation between different areas in Finland in terms of the severity of illness, treatment provided and the prominence of the type of mental health service (in-patient *v.* out-patient).²³ All these factors may contribute to the patient composition in each hospital. By controlling for the hospital district, we were able to take into account some of the geographical variation in patient overcrowding and violent assaults.

There are some important limitations to be considered. Even though we were able to adjust for a wide range of confounding factors, the possibility of residual confounding cannot be excluded neither in our study nor any other observational study. For example, we had no data on patient characteristics, such as diagnoses or severity of symptoms, which have been shown to be associated with violence among patients.¹ If only the most urgent and acute cases (i.e. those who are more likely to be violent) are admitted when occupancy rates increase, this can lead to a non-causal association between occupancy and violence. Although this does not seem a very likely explanation for our finding, further research is needed to examine this issue in greater detail. Future studies should also consider the extent to which factors such as adequate staff (in training or numbers) and inadequate physical dimensions of wards (for example, lack of single rooms that would provide patients with some personal space), security, gender mix, access to psychiatric intensive care unit, and length of stay contribute to the association between occupancy and violence.

Furthermore, our outcome measure, violent assaults, was based on the self-reports of staff and we only captured the timing of one incident. Thus, it is likely that the participants who had multiple events reported either the most recent or the most serious event. In addition, self-reports in general may involve errors arising from recall problems and under- or overreporting. In our study, the recall period was 5 months and we are not aware of any validity studies on the accuracy of recall of the timing of a violent event for such a period of time. However, it is unlikely that the variation in the accuracy of the reporting of such events was associated with the bed occupancy rate. The findings were still robust when a different definition of exposure time to overcrowding (2 months) was used that also included employees who might have had sickness absence after a violent event. Further research using hospital incidents reports as a data source would provide an important comparison to our results.

Findings from other studies

Previous research on this topic is scarce and, as discussed, has used small sample sizes in single or a couple of psychiatric units. Furthermore, previous studies have focused on violence in general, not differentiating between assaults on staff and violence between patients. Our results are in agreement with the studies of Ng *et al*¹⁰ and Palmstierna *et al*,¹¹ as well as with Nijman & Rector,¹³ suggesting an association between high bed occupancy and the occurrence of more violent incidents on the ward. In a

psychiatric hospital in the USA, Kalogerakis¹⁴ reported a negative association between average daily census (number of patients) and the recorded number of incidents at the hospital. However, that study was based on hospital-level data and lacked the sensitivity to detect unit-level changes in bed occupancy rates. Three small-scale studies carried out in single, 14- to 19-bed units^{8,9,12} failed to find any association between bed occupancy and patient violence.

Implications

Among patients, overcrowding may cause increased psychosocial stress, which potentially increases aggressive behaviour. Indeed, an association between crowding and aggression, which has been explained by increased stress, has been reported outside of hospital settings in both animal and human studies.^{24–26} Given that psychiatric hospitalisation in itself is a stressful experience, additional stress may be caused by overcrowding because of intrusions into personal space and disrupted patient and staff activities.²⁷

In this context, overcrowding, as associated with an increased proximity of other people, may increase anxiety in individuals to such a level that violent behaviour is triggered. Furthermore, the patients might more often get short shrift from the staff in the overcrowded hospital wards and become frustrated and angry, which may explain why we found a stronger association between overcrowding with violent assaults on staff than with assaults on ward property. However, these hypotheses need to be confirmed in future studies with suitable data.

Our study was carried out in public hospitals providing acute specialised psychiatric care for inhabitants in Finland. Further studies are needed to confirm the generalisability of our findings to a wider context such as long-term care, and countries with different healthcare systems; to identify mechanisms underlying the observed associations, that is, why overcrowding actually causes violence; and to identify the most vulnerable groups or settings. Record-based measures of violent assaults would also be needed to avoid bias arising from the use of self-reported data and to assess the accuracy of the timing of a violent event.

If the observed associations are causal, our findings have potentially important implications for the prevention of violence and the quality of psychiatric care.²⁸ Although exposure to violence at some level seems to be a part of the job in psychiatry, the rises in assaults and greater awareness of the effects of violence on the victims has created a need to establish safer environments in psychiatric hospitals.

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poems
by
doctors

Versions of a poem by Hesse

Adam Polnay

Night/night
scuttling
with nerves

Beside myself
you invite
the wind
into your hair

That's me, prowling
and chuntering
I don't even know
what I get out of this

I wouldn't have recognised you
those pretty pink knees
beneath your dancers' skirt
your tongue
circus lizard red

At night
I take to the streets
In the grip
of
invisible
scratches

I have really taken to them

Hermann Hesse (1877–1962) was a German-born Swiss writer. The poem that these versions take inspiration from is *Ich weiss, du gehst –*, which translates literally as 'I know, you walk', – from the collection *Poems*. Hesse is best known for his novels, including *Siddhartha* and *Steppenwolf*.

Dr Adam Polnay lives in Edinburgh. He has written several collections of poems, some short stories, and a short play. He is a speciality trainee in psychotherapy.

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