

Keywords: Violence; Behavior; Season; Week;
Daytime; PICU.

Incidence of violent behavior among patients in Psychiatric Intensive Care Units

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ABSTRACT – Background and Objectives: Both psychiatric acute units and psychiatric intensive care units (PICUs) focus on acute treatment of behavioral disturbances such as violence and aggressive threats and acts. The aim of the present study is to describe the frequency of violent behavior; such as verbal or physical threats and physical attacks, among patients admitted to psychiatric intensive care unit (PICU). In addition the relationship between the episodes of threats and/or attacks in relation to time of the day, days of the week, and their seasonal variations was explored.

Methods: All violent behavior was continuously assessed at the psychiatric emergency department. Data were collected during the period from May 2010 to May 2012.

Results: Patients with only one hospitalization were less violent than those who have had two hospitalizations. There was a statistically significant difference in violence among patients without formal secondary education and those who have not formal education. Violent behavior showed two peaks during the day; the first occurring at 1 pm and the second at 8 pm. In regard to seasonality, summer had a higher incidence of violence. The most peaceful seasons of the year were spring and autumn.

Conclusions: Violent behavior shows variation in daytime, days of the week and season in acute psychiatric intensive care. Daytime variation shows two peaks of violence at 1 pm and 8 pm, Sundays and Wednesdays being the quietest days regarding violence both in winter and summer. Patient's level of education and hospitalization status partially explain the variation.

Received: 13 July 2015

Revised: 17 November 2015

Accepted: 9 December 2015

Introduction

Both psychiatric acute units and psychiatric intensive care units (PICUs) focus on acute treatment of behavioral disturbances such as violence and aggressive threats and acts. Most patients with mental illness are not violent, and when violent behavior occurs, it usually lasts for a short time. Even so, it may lead to serious consequences for both patients and staff¹⁻⁴. The term violence is defined as acts of aggression that are particularly intense, heinous, infamous or reprehensible. Aggression as phenomenon is regarded as drive, defense mechanism, learned behavior, personality trait, or response to frustrated arousal^{5,6}.

This study explores four aspects of violence in PICU; verbal threats, physical threats, attack on objects and attack on persons. The occurrence and frequency of violence and aggression in intensive care units vary according to different studies⁷⁻¹¹. Despite a great deal of research over the past 20 years, it appears that the frequency and severity of violence in PICUs are increasing^{2,12-14}.

Clinical factors may be associated with violence in PICUs. There is no link between mental disorder and violence; but there is an association between patients with certain diagnoses, such as schizophrenia, especially the ones with positive symptoms such as delu-

sions and hallucinations, major mood disorders, comorbid substance use disorders, comorbid personality disorders^{16,17} and risk of violence^{15,9}. Moreover, the likelihood of aggression in patients with schizophrenia is reported to be higher when the unit is full¹⁸.

In relation to time of the day, Bowers and colleagues found that incidence of aggression fluctuate during the day. They reported that aggressive behaviour was most frequent between the hours of 8 am and 12 am^{19,3}. The fewest incidence of aggression was at night while the maximum number of incidence of aggression events were under staff shifts³.

Other studies point out that the most aggressive acts are in the afternoon and evening. They assume that peaks in aggression have a correlation with the activities of the department, including medication rounds, staff handover, meal times, or awake time^{20,1}. Furthermore, Whittington and colleagues have suggested that mornings are more vulnerable to violence and aggressive incidents because staff is less available to patients, and consequently there is increased interaction between patients¹. Manfredini and colleagues²¹ found that aggressive and violent behavior follows a 24-hour pattern. Their study suggests that the greatest number of violence and aggressive episodes occur in the early afternoon and the least number occur at night. During the day, when activity is high, the chance of violent events occurring is greater than at night,

when activity is low. Most of the treatments take place during the day. The authors explain this variation in terms of human contact and activities. In another study, Kaplan and colleagues found that violence appeared to peak between the hours of 8 pm and 12 am²².

There is also a variation in the incidences of violence during the weekdays. Most violent incidents occur earlier in the week, that is, from Monday to Wednesday²³. The most common explanations for the higher level of violence on weekdays were increased activity, greater movement around the department, and a higher patient count. Increased interaction between patients and staff may, therefore, have a negative effect^{24,23}.

Most available studies show seasonal variations in the occurrence of violent behavior. In a review study, the authors found a higher rate of violent behavior during the winter months. The researchers point out that there are more unstructured activities in the winter compared to the other seasons²⁵. Out of the thirteen studies examined by Bowers and colleagues, no clear incidence was found of violence related to calendar months. Despite that, most of the thirteen studies reported a little increase in violent incidents between the months of April and September³. Moreover, Gudjonsson and colleagues²⁶ believe it is more likely that months with higher rates of violence are due to more patients being hospitalized in the department than that the patients are more violent²⁶, and so there could be a statistical significance between violence and months with more admissions, but this has not been subject to any of the studies we have looked into.

Our study aimed to examine the frequency of violent behaviors such as verbal threats, physical threats, and physical attacks on objects and persons among patients admitted to psychiatric intensive care unit (PICU). Sec-

ondly, we wanted to explore the relationship between, the episodes of threats and/or attacks in relation to time of day, days of the week, and seasonal variations. Finally, clinical factors associated with violent behavior are also analyzed.

Methods

The study population included all the patients voluntary and involuntary admitted during a period of 3 years (May 2010 until May 2012). All violent behaviors, including, verbal threats, physical treats, attack on objects and physical attack on staff was routinely assessed by nurses after each episode using a standard schema provided by the research team.

Setting

Data were collect at Østmarka Department, psychiatric department at St. Olav's Hospital, Norway, with a catchment area of about 237 000 inhabitants. The emergency department consists of four sub-departments, i.e. two with one room for four patients, one with single room for two patients and one department section with psychiatric intensive care units (PICU) room for single patient. Incoming patients were placed in the department with the best capacity. The doctor on call evaluated the need for intensive care. The ward consists of a normally closed section (310 m²) and an intensive department (190 m²). The main entrance leads to the regular part of the department, where a lockable door separates the intensive care unit. The PICU consists of two wings with two rooms on each side. A shared living room area is located between the wings.

Measurements

The following characteristics of the respondents were collected: demographic data, data related to legal status of admission, time of admission, length of stay, diagnoses, and threats and physical violence.

Demographic data

The demographic data included age and sex. Age (by number of years) was categorized in young (18-30 years), middle-aged (31-50 years) older (≥ 51 years). Level of education was categorized as no formal education, education and unknown.

Legal status of admissions and length of stay in psychiatric intensive care units (PICU)

The legal status of admissions was registered as voluntarily (volunteer) or involuntarily (coercion). The length of stay in the seclusion area was noted as the number of days from the date of admission to transfer from the seclusion area.

Previous hospitalizations

Information about previous hospitalizations to the unit was registered from patient medical records and the patient administrative system.

Diagnoses

Diagnoses were set according to the ICD-10 research criteria in a consensus meeting with at least to senior psychiatrists/clinical psychologists and the therapist responsible

for the individual patient present. The diagnoses were categorized in five groups: psychoactive substance use disorders (F10-F19), schizophrenic spectrum disorders (F20-F29), mood disorders (F30-F39), personality disorders (F60-F69) and others.

Violent episodes, threats and physical attacks

All violent episodes, including time of each violent episode were registered. One episode could include up to 4 types of violent behavior; i.e. verbal threats (shouting, saying bad words to the staff and fellow patients), physical treats (threatening the staff that they will kill them and their family, threatening the staff that they will beat and knock them etc.), attack on objects (throw cups, plates and chairs and kicking furniture and walls) and physical acting on human beings (kicking the staff, throwing chairs and objects to the staff, etc.).

The type of behavior was registered for each time an episode took place. In this paper, the definition of verbal threat is a verbally expressed threat that may intimidate or cause insecurity on others. Physical threat is behavior intended to intimidate or threaten, such as getting close to, showing a fist, grabbing the clothes and threatening gestures such as "gun hand". Attacks are violent acts against someone or something with the intention to try to hurt, injure, or destroy something or someone¹².

Seasonal and diurnal variations

To study the seasonal variation the year was divided in four seasons with winter (December 2st 1st to Mars 20th), spring (March 21st to June 20th), summer (June 21st to September 20th) and fall (September 21st to December 20th).

Analysis

Data were analyzed by means of the PASW, version 20.0 (Chicago, IL, USA). An unadjusted analysis of categorical background data (sex, age, legal status of admissions and diagnosis) was performed with chi-square statistics to compare those with and without episodes of threats and or attacks. The variation of episodes, threats and attack, and single incidents by the hours a day, the week/weekend, and season were studied with chi-square statistics for categorical data and Mann-Whitney U test for continual data. The outcome variable "violent behavior" (within versus without violent episodes) was examined in unadjusted and adjusted binary logistic regression analysis, (the Enter method). The regression analysis presented included: age, sex, education, diagnosis group, admission status and readmissions.

The Data Protection at St. Olav's Hospital and the Department Head approved the project (scissors number 13/6804-2).

Results

Patient characteristics

During the study period a total of total of 886 violent episodes were committed by 230 patients (83 females, 36.1% and 147, 63.9% male) who were admitted to PICU. Patients without formal education shown more episodes of violent behavior than those with formal education ($p = 0.028$, $df = 2$) and had more often two or more admissions to the psychiatric hospital in the data collection period compared to those without violent behavior ($p = 0.005$, $df = 2$) (Table 1). There was no statistically significant difference in the distribution of age or sex. Overall, there were 297(51%) episodes of verbal threats,

226 (38.9%) of physical threats, 248 (42.7%) of physical attacks on persons and 95 (16.4%) attacks on objects. The mean of violent episode per patient was 5.3 ($SD = 7.8$) violent episode per patient.

The mean length stay in PICU were for the total sample 8.9 ($SD = 8.9$) days. The mean length of stay was 13.5 ($SD = 13.3$) days for patients with violent behavior and 5.3 ($SD = 7.1$) days for patients without violent behavior. There are no significant differences between the groups of diagnosis and admission status.

Seasonal variations

Spring and autumn are the most peaceful periods of the year (Chi-square 46.174, 9 df, $p < 0.001$). Of the total 865 single incidents only 127 (14.7%) and 108 (12.6%) were registered in the spring and the fall, respectively. In spring and autumn, violent behavior was classified as threats (verbal or physical) in 74 (58.3%) and 62 (57.4%) of the cases (Figure 1).

The summer months had a total of 355 threats and/or physical attacks and comprise 40.9% of all incidents, and 246 (69.3%) of those incidents were verbal and physical threats. In July alone, there were 88 episodes (16.2% of all episodes) including 129 (14.9%) incidents, where 103 (79.8%) of those were verbal and physical threats. Over the two year registration period, it was registered totally 275 (31.5%) incidents in the winter period where 141 (51.2%) were threats (verbal or physical). The winter is the season where physical attacks were most prevalent (Chi square 21.98, $df = 3$) $p < 0.001$) and 97 (72.4%) of those were physical attacks on other patients or personal. December was a peaceful month, with only 25 episodes, including 26 incidents of threats and 15 incidents physical attacks; which is about one-third of the incidents registered in July.

Table 1
Characteristics of patients with and without violent behavior

	Total N	Violent behavior		No-violent behavior		P-value ¹	df	Value ²
		n	(%)	n	(%)			
N Patients	230	102	(100)	128	(100)			
Age (years) ³								
Young	77	31	(30.4)	46	(35.9)	0.243	2	2.833
Middle-aged	110	55	(53.9)	55	(43.0)			
Older	43	16	(15.7)	27	(21.1)			
Gender								
Male	147	64	(62.7)	83	(64.8)	0.742	1	0.108
Female	83	38	(37.3)	45	(35.2)			
Status								
Education								
No education	118	62	(60.8)	56	(43.8)	0.028	2	7.127
Education	85	32	(31.3)	53	(41.4)			
Unknown	27	8	(7.8)	19	(14.8)			
Admissions								
One	180	70	(68.6)	110	(85.9)	0.005	2	10.460
Two	31	21	(20.6)	10	(7.8)			
Tree or more	19	11	(10.8)	8	(6.3)			

¹Significance level $p \leq 0.05$.

² Chi-square tests, 5.

³Young = 18-30 year, middle-aged = 31-50 year and older = 51 year>.

Diurnal variations

There was a peak in threats and/or physical attacks at 1:00 p.m. and at 8:00 p.m. (44 episodes at both points in time) including 64 and 71 incidents, respectively. The number of incidents were quite similar at night and in the morning (Figure 2) and low compared to these incidents in the afternoon and evening (190 threats and 122 attacks in total vs 331 threats and 221 attacks), although difference was not statistically significant (Chi-square 3.429 df = 1, $p = 0.064$).

Weekly variations

The mean number of episodes, and incidents of threats and attacks per day over the two-year study-period were 77.6 (SD = 6.7), 72.6 (SD = 12.8) and 48.1 (SD = 6.5), respectively. Mean number of incidents of threats (verbal and physical) and attacks (on objects and humans) per weekday and day in the weekend are presented in Figure 3. There were significantly more attacks on objects and fewer physical attacks on people on weekdays compared to the weekends (Mann-Whitney U test $p = 0.05$).

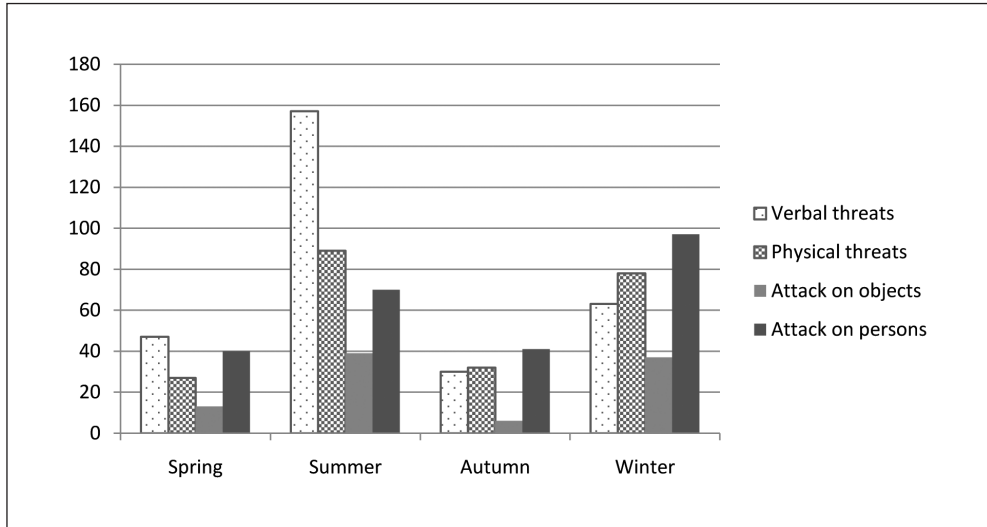


Figure 1. Total number of verbal threats, physical threats, attacks on objects, and physical acting out.

Note: The season's variation was done in the following way: Spring from Mars-Mai; Summer from June-August; Autumn from September-November and Winter from December-February.

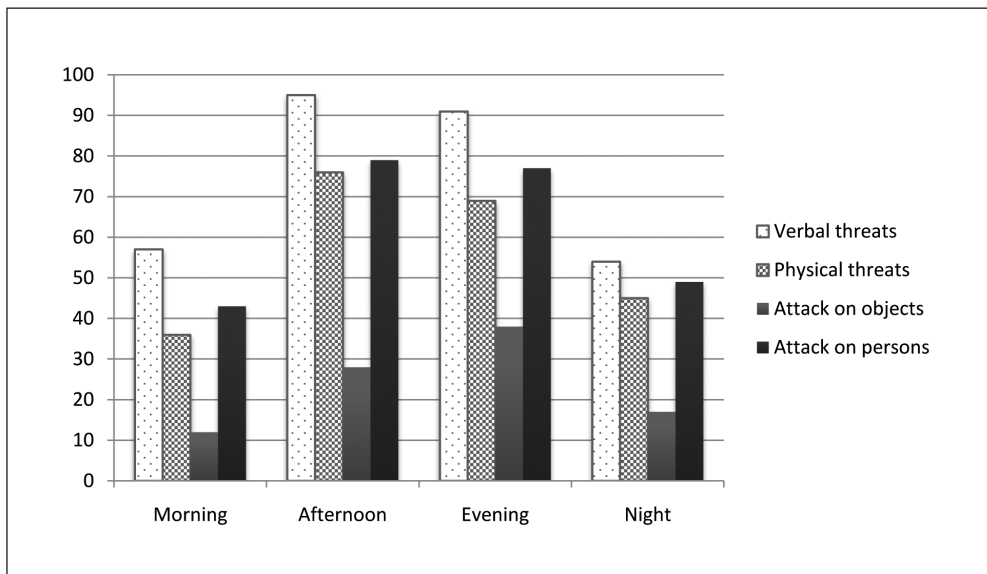


Figure 2. Diurnal variation.

Note: The day was organized in four intervals: 00:01 – 06:00, 06:01 – 12:00, 12:01 – 18:00 and 18:01 – 00:00.

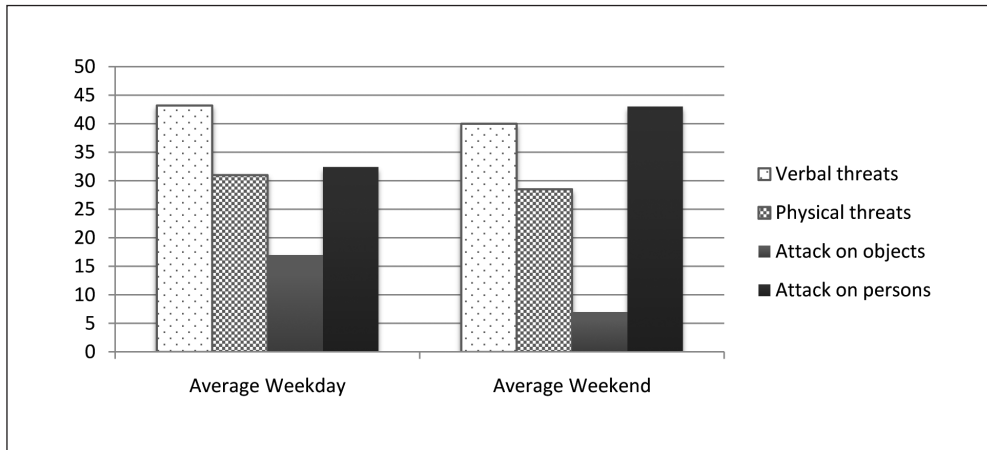


Figure 3. Weekly variations.

Table 2
Diagnosis and admission status of patients with and without episodes of violent behavior

Diagnostic group	Total N	Violent behavior		No-violent behavior		P-value ¹	df	Value ²
		n	(%)	n	(%)			
Psychoactive abuse (F10 - F19)	30	16	(15.7)	14	(10.9)	0.613	4	2.679
Schizophrenic spectrum disorders (F20 - F29)	81	37	(36.3)	44	(34.4)			
Mood disorders (F30 - F39)	46	21	(20.6)	25	(19.5)			
Personality disorders (F60 - F69)	22	7	(6.8)	15	(11.7)			
Others ³	51	21	(20.6)	30	(23.4)			
Admission Status								
Involuntary	153	74	(72.5)	79	(61.2)			
Voluntary	77	28	(27.5)	49	(38.3)			

¹Significance level $p \leq 0.05$.

² Chi-square tests.

³ The following diagnoses are among the "others": organic, including symptomatic, mental disorders (F 0-9), behavioural syndromes associated with physiological disturbance and physical factors (F50-59), mental retardation (F 70-79), disorders of psychological development (F 80-89), behavioural and emotional disorders with onset usually occurring in childhood and adolescence (90-99 F), and suspected mental illness (Z-diagnoses).

Factors associated with violent behavior in psychiatric intensive care units (PICU)

In adjusted logistic regression analysis (Table 3), the odds for violent behavior was higher in those having two admissions (OR = 3.23, 95% CI = 1.37-7.58) compared to those with one admissions. No statistical significance was found in relation to diagnosis groups and violence.

Discussion

The first aim of present study was to identify the frequency of violent behavior in one PICU in Norway, putting particular emphasis on the incidence of violent behavior and time of the day, days of the week, and season. Daily variation indicates two clear peaks related to violent episodes during the day; the first peak being at 1 pm and the second at 8

Table 3
Adjusted logistic regression analysis (OR and 95% CI) for episodes of violent behavior (versus not) (N = 230)

		OR	95% CI	P-value
Gender	Male		Ref. 1.00	0.406
	Female	0.779	0.432-1.405	
Age (year)	Young		Ref. 1.00	
	Middle-aged	1.168	0.504-2.706	0.718
	Older	1.527	0.695-3.355	0.292
Education	No formal education		Ref. 1.00	
	Education	2.162	0.844-5.536	0.108
	Unknown	1.022	0.380-2.749	0.965
Involuntary admission	Involuntary		Ref. 1.00	
	Voluntary	1.678	0.906-3.108	0.100
Diagnostic group	Psychoactive abuse (F10-F19)		Ref. 1.00	
	Schizophrenic spectrum disorders (F20-F29)	1.358	0.502-3.679	0.352
	Mood disorders (F30-F39)	0.889	0.409-1.931	0.766
	Personality disorders (F60-F69)	1.113	0.082-1.143	0.178
	Others	0.496	0.159-1.549	0.227
Admissions	One		Ref. 1.00	
	Two	3.171	1.356-7.415	0.008
	Three or more	1.776	0.645-4.891	0.266
Nagelkerke R			13.5%	

OR = odds ratio, CI = Confidence intervals.

pm. At the hospital, where the study was conducted, the majority of therapy conversations were conducted until 1 pm. These conversations often include sensitive topics such as medications, release from the hospital, and treatment on a voluntary or involuntary basis. Such topics may trigger anger and violence among some patients. These factors could build up during the day and may cause feelings of aggression towards the end of the day. This may partly explain why violent behavior appears to peak at 8 pm. Another explanation for this may be that this is the time staff distribute medications. Many patients receive medications against their will, and this too can lead to frictions between the staff and the patient which can trigger violent behavior. The results of this study are well supported in previously studies^{16,10,21} which conclude that the timing of violent behavior is related to increased interaction between patients and staff. Fottrell²⁷ found that clinical activities were important factors in generating violence in acute wards and that violence was very much a daytime phenomenon, very little occurring between 10 pm. and 7 am. This can be partially explained by the use of sleep medication and anxiolytics in the evening hours. As our data did not include medication information we did not have a chance to analyze effect of daily medication on violence²³. There were more attacks on persons on the weekends than on weekdays. On the weekdays there were more verbal threats and attacks on objects. This is in accordance with the earlier findings that increased interaction between patients and staff might have a negative effect on behavior, as described in several studies^{28,29,20} where they found that violence increased significantly when the activity of the department was high. However, in our study, we found that when staffing is low, in the evenings and weekends, the violence is higher. We also found that there were several physical attacks when

the activity of the department is low as in weekend. This disagreement can be partially explained by the difference in definition of violence, as we defined violence in more detail, being verbal threats, physical threats, attacks on objects and people.

On weekdays, interactions are usually significantly higher than on weekends, with increased staffing and activity level. Despite this, the violence level as verbal and physical threats and attacks on objects was higher on the weekdays but attacks on people was lower on weekdays than on weekends. On the weekends the attacks on objects were very low and attacks on persons was very high. This may indicate that a reduced level of activity does not necessarily reduce the incidence of physical violence.

Both verbal and physical threats were higher in the summertime with about three times more verbal threats recorded. In July, half of the staff was on holiday, and younger, less experienced or even untrained personnel often replaced the experienced staff. Access to public mental health care was also reduced in the summer months. At summertime there was a significant increase of verbal and physical threats in spite of the fact that there was no clear increase in the number of patients in the department. It is worth noticing that in the summer time, physical acting out was greatly reduced compared to verbal threats. Attacks on persons were higher in the winter time than in the others seasons. Autumn and spring were the quietest seasons of the year which is in agreement with Bowers and colleagues, who found this also to be the case in their review study³⁰.

The study showed that patients with only one hospitalization showed more violence than those who have had two hospitalizations. This can be explained by the fact that patients with earlier admissions may become

more familiar with hospital routines and have greater familiarity with and knowledge about the staff and the unit and therefore be less prompt to react.

There were associations among patient's level of education and violence. Patients without formal education were more often associated with violent behavior than patients with no formal education. Level of education was correlated significantly with violence in unadjusted analyses, although once adjusted in a regression model it lost its statistical significance. Many of uneducated patients with no formal education may have reduced insight into their illnesses and they may suffer a greater decline in social status while educated patients may have a greater understanding and insight of their illnesses. This may lead to having more interest in seeking for knowledge about their illness, causing reduction in violent behavior^{31,32}.

Study limitations

Firstly, as the definition, rates, and threshold for classifying an act as violent behavior differ significantly among countries, it is hard to generalize the findings across countries. Secondly, because all the data in this study comes from the same hospital and the same catchment area, it may be difficult to draw firm conclusions applicable to all patient populations. Finally, violent behavior was registered not via a standard instrument but as a journal recording at the time of the incidence. Interpretation of this recording afterwards by others may cause errors in form of over or under reporting.

Conclusion

In conclusion, patient's violent behavior showed variation in times of the day, days of the week and seasons in acute psychiatric intensive care. Most of the violent behavior occurred during the daytime. Daytime variation showed two peaks of violence at 1pm and 8pm. Patients level of education and hospitalization status partially explain the variation. Violence is a result of a complex interaction of factors and cannot be attributed to a single factor. For this reason, it is important to explore the challenges that acute psychiatric intensive care and patients are confronted with. The identification of these challenges would help to address patients' needs and effectively prevent violence. We believe that this study helps to shed light on a subject with important implications for clinical practice, patients, and staff as well.

Conflict of interest

There is no conflict of interest.

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