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Frequency of falls and contributing factors in hospitalized patients with severe mental disorders

Abstract

Introduction: Psychiatric patients have a higher rate of falls even in the hospital setting compared to other patients; falls are a safety concern because of the negative consequences for health and quality of life. Methods: descriptive, retrospective study. A total of 162 clinical records of patients who fell during hospitalization were analyzed. Factors for falls were classified as intrinsic and extrinsic. Frequency and percentages of qualitative variables were calculated and the U-Mann Whitney test was used to compare means of qualitative variables. A logistic regression model was constructed. All analyses were performed using SPSS version 26 statistical software. Results: The frequency of falls was higher in women (n=110) with a rate of 5.4 falls per 1000 hospital days. 27.2% had more than two falls and 67.3% of patients were injured when falling (6.2% serious). In 30.9%, the adverse effect of psychotropic drugs was identified as the probable cause of the fall. Some of the predictors of falls that showed a significant difference were: cognitive impairment (ExpB=2.59), female sex (ExpB=6.41) and night shift (ExpB=1.16). Conclusions: We identified that the variables female sex, cognitive impairment (intrinsic factors) and night shift (extrinsic factor) explain the higher probability of falling during hospitalization. We consider that cognitive assessment should be included to identify the risk of falling and reduce the staffing deficit in the night shift.

Keywords: fall, psychiatric hospital, mental disorder, polypharmacy, cognition, medical care

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Introduction

The WHO defines falls as unintentional events that cause the body to lose its balance and hit the ground or other firm surface that stops it; each year there are around 37.3 million falls, which are the second leading cause of death due to unintentional injuries, causing 424,000 deaths globally and 80% of deaths in low- and middle-income countries.[1] Although the risk of falling is present in the entire population, it is adults over 65 years of age who suffer the most falls that are consider fatal.[2] Falls are among the most common types of adverse events in hospitalized patients, estimated at 1.3 to 1.4 falls per 1000 patients/day, with up to 30% of the cases involving some type of injury.[3] Falls represent between 29% and 89% of all incidents in hospitals.[4] Since falls are a safety problem for patients due to the physical, legal and quality of life consequences, it is of utmost importance to know which factors contribute to falls and thus propose preventive strategies to reduce their incidence.[5]

Circumstances that contribute to the occurrence of falls have been classified into intrinsic factors include physiological conditions such as low vision, dizziness, incontinence, age, cognitive difficulties, balance and gait difficulties, and polypharmacy. Extrinsic factors refer to an individual's immediate environment, including crowded hospital rooms, loose electrical cords and spills.[6] From an inpatient perspective, three themes have been proposed for analysis: the environment (extrinsic) consists of safe mobilization in hospitals and relying on others to prevent falls, the individual (intrinsic) includes understanding one's own needs, confusion increases risk and fear of falling, and the outcomes which include awareness of consequences, falls education and mental retraining, the authors conclude that from this perspective one can understand patients' risk perception and education needs.[7] Several studies have documented that aspects such as response to medication, vital signs, glycemia, diabetes mellitus, mobility, hypertension and mental state can increase the risk of falls in hospitalized patients.[8] In the psychiatric population, several studies highlight factors that favor falls, in addition to mental state, psychotic symptoms, cognitive distortions, having received electroconvulsive therapy and other factors such as treatment with psychotropic drugs.[9] The presence of medical comorbidities such as cardiovascular or locomotor system diseases or receiving treatment with drugs that increase the risk of falls, such as angistensin-converting enzyme inhibitors.[10,11] In Latin America there are few reports on the prevalence and risk factors of falls in psychiatric patients hospitalized or in general hospitals, and in the context of Mexico there are reforms to enable psychiatric hospitalization departments in second and third level general hospitals. Our objectives were to document the frequency of falls and to analyze which factors contribute to falls in patients admitted to a psychiatric hospital in Mexico City.

Material and methods

An observational, retrospective, analytical, retrospective study was designed. Location: Hospital Psiquiátrico "Fray Bernardino Álvarez" (HPFBA), located in Mexico City. The hospital has 248 continuous hospitalization beds, 12 emergency beds, 18 intensive care beds and 28 beds for elderly patients. The average length of stay is 22 days. It provides medical care to the population without social security. The main reasons for care are acute psychosis (schizophrenia, bipolar disorder, depression with psychosis, psychosis secondary to the consumption of toxic substances), attempted suicide and severe psychomotor agitation.

Data source

Record of falls of patients hospitalized between 01 January 2016 and 31 December 2022, who fell during hospitalization. A total of 307 fall records were identified. Clinical records were located to collect the variables of interest (Figure 1).

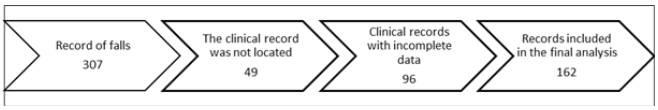

Figure 1 Record selection flow chart.

Variables

Variables were grouped as follows: intrinsic: age, sex, older than 60 years, cardiovascular disease, epilepsy, diabetes, cognitive impairment, number of psychiatric diagnoses, number of medical comorbidities, history of falls in the last 3 months, gait conditions, Montreal Cognitive Assessment (MoCA) scale score, and presence of psychomotor agitation. Glycemia, heart rate, systolic and diastolic blood pressure at the time of the fall. Extrinsic: hospital service (emergency or inpatient), location of the fall (common areas, bedroom, bathroom), time of day (daytime, nighttime), days of hospitalization, mechanism of fall, equivalent dose of antipsychotics, equivalent dose of benzodiazepines, total psychotropic and general drugs, hours of last drug modification, type of admission (voluntary, involuntary), mobility support, Morse scales score. Consequences: presence, type, severity and location of injuries. The variables age group (<60 and >60 years), falls group (1 fall and 2 or more falls), injuries (with/without injury), total psychotropic drugs (<3 and >3 drugs), general drugs (none, 1-2 and >3), equivalent dose of antipsychotics and benzodiazepines were constructed.

Analysis

For categorical variables, frequencies and percentages were estimated; for continuous and discontinuous variables, median, mode, minimum and maximum values were calculated. The distribution of the data was calculated with the Kolmorodov test. Comparison of the groups was performed with the U-Mann-Whitney test. Binary regression analysis was performed to determine the factors contributing to falls. Statistical significance p=<0.05 was accepted. The data were analyzed in the SPSS version 26 statistical program.

Ethical considerations

The project was approved by the Research and Research Ethics Committees of the Hospital Psiquiátrico "Fray Bernardino Álvarez", registration CI-965. Due to the research design, informed consent was not applied.

Results

In the period analyzed, 19,181 admissions (men [H] 9 792, women [M] 9 389) and 307 fall events (H=104, M= 205) were recorded, the H: M ratio=0.5. The rate was 5.4 falls per 1000 hospital-days. Median age was 51 years (min=17-max=82). Psychosis was the most frequent diagnosis (69, 42.6%), followed by depression (29,17.9%) and bipolar disorder (27, 16.7%). Forty-two percent had 2 or more medical comorbidities (28.4% cardiovascular disease, 27.2% cognitive impairment, 20.4% diabetes mellitus, and 8% epilepsy) (Table 1).

Table 1 Clinical characteristics of the fall and injury by sex

	Sex n (%)		**Total**
ICD 10 diagnosis	**Male (52, 32.1%)**	**Female (110, 67.9%)**	**162(100%)**
Schizophrenia	12 (7.4)	30 (18.5)	42(25.9)
Psychosis (schizophreniform, schizoaffective, delusional disorder, psychotic or psychosis)	6 (3.6)	21(13)	27 (16.7)
Bipolar disorder	8 (4.9)	19 11.7)	27 (16.7)
Severe depression	9 (5.6)	20 (12.3)	29 (17.9)
Dependence on toxic substances	7 (4.3)	2 (1.2)	9 (5.6)
Personality disorders	0 (0)	3 (1.9)	3 (1.9)
Mental retardation	1 (0.6)	2 (1.2)	3 (1.9)
Dementia	1 (0.6)	5 (3.1)	6 (3.7)
Other mental disorders due to brain injury, dysfunction, or disease	8 (4.9)	8 (4.9)	16).9)
Place of the fall	Male (52, 33.8%)	Women (102, 66.2%)	154 (100%)
Common areas	24 (15.6)	47 (30.5)	71 (46.1)
Bathroom	13 (8.4)	22 (14.3)	35 (22.7)
Room	15 (9.7)	33 (21.4)	48 (31.2)
Injury severity	Male (43, 30.3%)	Female (99, 69.7%)	142 (100%)
Without injuries	9 (6.3)	24 (16.9)	33 (23.2)
Minor injury (excoriation, contusion, hematoma)	23 (16.2)	55 (38.7)	78 (54.9)
Moderate injury (blunt wound, tear, sprain, dislocation, bursitis, tendonitis)	8 (5.6)	13 (9.2)	21 (14.8)
Serious injury (fracture,TBI)	3 (2.1)	7 (4.9)	10 (7)
Anatomical location of the lesion	Male (41, 31.5%)	Female (89, 68.5%)	130 (100%)
Face (dental parts, facial mass, lips, nose, eye)	7 (5.4)	12 9.2)	19 (14.6)
Head	17 (13.1)	21 (16.2)	38 (29.2)
Chest	2 (1.5)	6 (4.6)	8 (6.2)
Hip	1 (0.8)	5 (3.8)	6 4.6)
lower limb	4 (3.1)	8 (6.2)	12 (9.2)
Superior member	1 (0.8)	13 (10)	14 (10.8)
No injury	9 (6.9)	24 (18.5)	33 (25.4)
History of fall in the last 3 months	Male (51, 33.1%)	Female (103, 66.9%)	154 (100%)
No	29 (18.8)	50 (32.5)	79 (51.3)
Yeah	22 (14.3)	53 (34.4)	75 (48.7)
Medical comorbidity	Male (52, 32.1%)	Female (110, 67.9%)	162 (100%)
None	18 (11.1)	22 (13.6)	40 (24.7)
An illness	17 (10.5)	37 (22.8)	54 (33.3)
Two or more comorbidities	17 10.5)	51 (31.5)	68 (42)

Women accounted for 67.9% of the falls. 48.3% reported a history of a fall in the last 3 months. Most of the falls occurred in common areas (46.1%), less frequently in the bathroom. 27.2% had 2 or more falls, women fell more frequently twice. Twenty-three percent had no injuries, 54.9% were minor injuries, and there were 10 cases of serious injuries due to fracture or head trauma. The most frequent anatomical locations of the injuries were the head and face. (Table 1).

The non-parametric analysis showed that women were older, had higher Morse scale scores at the time of the fall, with statistically significant differences and lower MoCA scores p=0.094. When comparing the age groups <60 and >60 years, significant differences were only found for the total number of falls, which were higher in the group <60 years. The age of patients with more than two falls was higher (p=0.001). Likewise, glycemia levels and Morse scale score were higher in patients with more than two falls (p<0.05). Patients with lesions had lower MoCA scores and higher diastolic blood pressure with statistically significant differences with respect to those without lesions. (Table 2).

Table 2 U-mann whitney test of variables sex, age, falls and consequences. (n=162)

		Sex		Age group		Falling group		Consequences	
		Female n=110 (67.9)	**Male n=52 (32.1)**	**< 60 years n=126 (77.8)**	**> 60 years n=36 (22.2)**	**1 fall n=118 (72.8)**	**2 or more n=44 (27.2)**	**Without injury n=33 (20.4)**	**With injury n=109 (67.3)**
	Median (Vmin-Vmax)**								
	Age	p= 0.003		------		p= 0.000		p= 0.302	
	51 (17-82)	52 (17-82)	42 (18-73)	------	------	43.5 (17-75)	56 (33-82)	53(19-74)	45(17-82)
	Total number of falls	p= 0.001		p= 0.016		------		p= 0.871	
	1 (1-7)	1 (1-7)	1 (1-4)	1 (1-7)	1 (1-5)	------	------	1(1-7)	1(1-7)
	Total psychiatric diagnoses	p= 0.012		p= 0.235		p= 834		p= 0.853	
	2 (1-4)	2 (1-4)	2 (1-4)	2 (1-4)	2 (1-3)	2 (1-4)	2 (1-3)	2(1-3)	2(1-4)
	MoCA+	p= 0.094		p= 0.426		p= 0.687		p= 0.013	
	18 (1-26)	18 (1-25)	21 (7-26)	19 (4-22)	18 (1-26)	18 (4-25)	18 (1-26)	21 (13-26)	17.5 (1-22)
	BPRS++	p= 0.791		p= 0.497		p= 0.792		p= 0.287	
	27 (5-47)	27 (6-47)	27 (5-45)	28.5 (5-47)	26 (6-46)	27 (5-47)	27 (7-46)	30.5 (13-47)	27 (5-46)
	Glycemia	p= 0.342		p= 0.668		p= 0.012		p= 0.099	
	104 (20-184)	105 (60-167)	90 (20-184)	104 (20-184)	106 (76-167)	96.5 (20-184)	117.5 (76-141)	84(60-143)	105(20-184)
	Systolic blood pressure	p= 0.516		p= 0.208		p= 0.354		p= 0.915	
	110 (60-160)	110 (60-160)	110 (90-135)	110 (60-160)	110 (80-150)	110 (60-160)	110 (80-140)	110(80-130)	110(60-160)
	Diastolic blood pressure	p=0.935		p= 0.881		p= 0.373		p= 0.044	
	70 (40-100)	70 (40-100)	70 (50-90)	70 (40-100)	70 (50-80)	70(40-100)	70(50-80)	60(50-90)	70(40-100)
	Heart rate	p= 0.403		p= 0.770		p= 0.872		p= 0.623	
	79 (20-115)	80 (20-110)	77 (59-115)	79 (20-115)	79.5 (52-100)	79(20-115)	79.5(59-94)	82(20-115)	80(45-110)
Intrinsic	Days of hospitalization	p= 0.557		p= 0.074		p= 0.001		p= 0.071	
	9 (0-89)	9 (0-89)	8.5 (0-32)	9 (0-64)	11 (0-89)	8 (0-64)	15.5 (1-89)	9(0-43)	10(0-89)
	Morse Fall Scale	p= 0.011		p= 0.601		p= 0.001		p= 0.890	
	50 (10-125)	55 (10-125)	40 (15-105)	50 (10-125)	50 (15-105)	40 (10-125)	65 (40-105)	55 (15-105)	50 (10-125)
	Antipsychotic equivalent dose, 9.9 (0.77-47.86)	p= 0.044 8.69 (0.77-47.86)	10 (1.55-35.01)	p= 0.211 10 (0.77-47.86)	7.3 (0.77-30.12)	p= 0.872 10(0.77-47.86)	9(1.25-29.29)	p= 0.453 10(2.5-47.86)	9(0.77-35.01)
	Total benzodiazepines	p= 0.121		p= 0.784		p= 0.273		p= 0.586	
	1 (1-2)	1 (1-2)	1 (1-2)	1 (1-2)	1 (1-2)	1(1-2)	1(1-2)	1(1-2)	1(1-2)
	Benzodiazepine equivalent dose	p= 0.014		p= 0.468		p= 0.007		p= 0.731	
	30 (5-160)	30 (5-120)	40 (5-160)	30 (5-160)	30 (5-120)	30(5-160)	25(5-80)	30(5-120)	30(5-160)
	Total number psychotropic drugs	p= 0.990		p= 0.449		p= 0.230		p= 0.182	
	3 (1-7)	3 (1-6)	3 (1-7)	3 (1-7)	3 (1-7)	3(1-7)	4(1-6)	3(1-6)	3(1-7)
Extrinsic	Total number general drugs	p= 0.187		p= 0.021		p= 0.534		p= 0.904	
	2 (1-6)	2 (1-6)	2 (1-6)	2 (1-6)	2 (1-6)	2(1-6)	2(1-6)	2(1-5)	2(1-6)

*P-value Mann-Whitney U-test.** Minimum and maximum value. +. Montreal Cognitive Assesment (MOCA). ++. Brief psychiatric rating scale (BPRS). In bold p-value<0.05.

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Increased antipsychotic dose in the last 24 hours before the fall was in 23% of patients. 35.2% of the patients treated with benzodiazepines had no modifications in their treatment and 20.4% had their initial dose of benzodiazepines decreased within the last 24 hours before the fall. Regression analysis showed that the variables female sex, presence of cognitive impairment and night shift explained the probability of having more than two falls during hospitalization, female (p=0.01; Exp B: 6.4), cognitive impairment (p=0.03; Exp B: 2.5), night shift (p=0.763, Exp B:1.16). The value of x2=26.752, p=0.001, Nagelkerke's r-squared 0.253, Hosmer and Lemeshow test value p=0.852. (Table 3).

Table 3 Regression analysis of factors contributing to having more than two falls

	B	E.T.	Wald	gl	Sig.	Exp(B)	I.C. 95% para EXP(B)	
							Inferior	Superior
Sex	1,863	,582	10,257	1	,001	6,441	2,060	20,137
Cognitive impairment	,952	,451	4,452	1	,035	2,591	1,070	6,272
Emergency Service	-,638	,436	2,134	1	,144	,529	,225	1,243
Night shift	,156	,518	,091	1	,763	1,169	,423	3,230
>3 psychotropic drugs	-,785	,424	3,429	1	,064	,456	,199	1,047
Involuntary admission	-,022	,661	,001	1	,973	,978	,268	3,573

Discussion

Our main objective was to identify predictors of falls in hospitalized patients with mental disorders and the frequency of falls in a psychiatric hospital. We found that the rate of falls was lower than that reported in a North American study involving psychiatric hospitals.[12] Nevertheless, it is similar to the prevalence reported in China adult psychiatric patients and older adults was 3% and 7.3% respectively.[13] The prevalence of falls has been significantly associated with psychiatric diagnostic criteria and male gender in older adult patients.[14] During the period analyzed the number of women hospitalized was lower but they had twice as many falls as men, there were no significant differences with respect to the characteristics of men, except in the Morse scale score. We believe that this is due to the fact that, the mean age in women was higher, has also been documented that there are no significant differences in the rates of falls by sex.[15] Regarding age, most studies report that age >65 years is mostly associated with falls; although younger patients in psychiatric units also face fall risks similar to those of older adults due to the presence of mental disorder and the use of multiple medications in a patient.[16, 17] In particular, psychotropic drugs such as antidepressants increase the risk of falls in the first three months of treatment, with a higher risk in women, which may be due to anticholinergic and antihistaminic effects.[18]

Falls have consequences for patients and institutions, the main consequence for patients being injuries. In the present study, the frequency of injuries was 67.3%, of which 6.2% were serious injuries. Other studies have reported lower percentages of 44-60%.[19] The variation in the frequency of injuries is possibly due to the context of the hospital (personnel, infrastructure, and organization) and type of patients attended. For example, in this study, falls were less frequent in the emergency department than in the inpatient department. This may be explained, by the fact that in the emergency department there are more staff than in other areas and that patients remain in bed most of the day, compared to the hospitalization department where patients walk freely through the corridors and move to other areas of the hospital to complement their treatment. Previous studies have indicated that the frequency of falls is higher in critical care areas, information that does not agree with the findings of our study.[20]

Patients who presented more than one fall had significant differences predominantly in extrinsic factors. With respect to days of hospitalization, were document that more than half of the falls occur in the first month after admission.[13] It is possible that the short length of stay of patients could have resulted in longer fall rates. According to other studies benzodiazepines, atypical antipsychotics, antidepressants, anticonvulsants, mood stabilizers, and medication titration in the last 24 hours are significant predictors of falls in hospitalized psychiatric patients due to side effects mainly dizziness, drowsiness, orthostatic hypotension, confusion, and extrapyramidal symptoms.[21, 22]

The variable > 3 psychotropic drugs partially explained the increased risk of falls. One study found that the use of 2 or more psychotropic drugs classified as having a high risk of producing falls increased the risk up to 2-fold; among these types of drugs are those that act on the cardiovascular, endocrine, and central nervous systems, as well as nonsteroidal anti-inflammatory drugs, which by themselves increase the risk.[23] In our study, the probability did not increase, possibly because the HPFBA attends patients in acute epidemic and requires prescription of more psychotropic drugs for symptomatic control, but polypharmacy should be avoided as much as possible and modifications in pharmacological prescriptions should be slow and constant. Cognitive impairment was associated with an increased risk of falling. In the HPFBA, the cognitive assessment is not a routine part of fall risk, but several studies have shown that including cognitive and mobility assessment improves fall risk prediction in physical rehabilitation wards.[24] Interventions such as assessing cognition, standing and decubitus blood pressure, medication review, nighttime medication review, among others, improve fall prevention in psychiatric care units.[25]

In countries such as Mexico and other Latin American countries, the deficit of nursing staff in public hospitals is high, hence the need to implement improvement plans that include patient and staff education. In particular, staff education is associated with a reduction in the rate of falls in the hospital.[26] A systematic review demonstrated that patient-centered assessment reduces the risk of falls in intensive care units. Patient education is fundamental in the prevention of falls, educating the patient about the increased risk of taking medications and the need for mobility restrictions to prevent falls reduces the number of falls. There are some limitations in the present work: first, although the reporting of falls is mandatory in the HPFBA, there may have been underreporting because falls without injuries were considered minor events. Secondly, we did not have access to all the records of the adverse events registry. Thirdly, half of the adverse events recorded in the hospital census did not have a record of the incident in the clinical record, so we were unable to obtain complete data for analysis.

Conclusion

Finally, we identified that, the rate of falls and injuries is similar to that reported in other contexts. The equivalent dose of

benzodiazepines, polypharmacy, continuous hospitalization service, and shift are associated with the risk of falls; therefore, it is necessary to make health personnel aware of these identified variables in order to prevent damage to patient health and provide a safe environment. It is necessary to mention that there is a need for more studies focused on identifying the risk factors for falls in the hospitalized psychiatric population, since Mexico is currently in the process of making it mandatory for general hospitals to have psychiatric hospitalization areas. In addition, staff and patient education for falls prevention should be a priority, as well as the creation of interventions in accordance with the Latin American context.

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Conflicts of interest

The authors declare that there is no conflicts of interest.

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