Falls Epidemiology at King Abdulaziz University Hospital, Jeddah -Saudi Arabia-2009

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Abstract: Aim: Fall is considered usually as a sensitive quality indicator associated with patient safety, quality of care, and unfortunately risk of morbidities including head injuries and fractures. Hospital falls were found to be related mainly to the patient characteristics, plus some circumstances and activities which may facilitate these falls to occur. It affects approximately 2% to 17% of patients during their hospital stay and falls rate varies from 1.4 up to 17.9 falls per 1000 patient days depending on hospital type and patient population. Although there is some researches about falls in developing countries, however most of these lack investigating the underlying causes and SA is not an exception of this rule. **Objectives:** To determine the magnitude of falls among hospitalized patients at King Abdulaziz University Hospital (KING ABDULAZIZ UNIVERSITY HOSPITAL) in two wards; medical and surgical and to study the predisposing factors and co-morbidities. **Design and setting:** A cohort prospective study for a period of 3 months was applied targeting male and female patients in the two selected wards using an structured interview questionnaire **Main outcomes measure:** Number of cases sustaining falls and fall risk factors related to the patient health status, environment and nursing. **Results:** Total fallers were 2.4% of the total cases reviewed (1115 cases; mean age: 48.59 ± 19.931years) with 70.4% and 29.6% observed in medical and surgical wards, respectively with significant difference (*P*<0.05). Among the fallers, males represented 51.9% of the cases. Syncope, vertigo, degree of alertness before fall, a previous history of fall in the past three months, wet floor, lowered bed side rails, malfunctioning of emergency system were among the significant predisposing factors to falls among studied sample(*P*<0.05). **Conclusion:** Falls are not uncommon among hospitalized patients (2.4%) with various predisposing factors such as Syncope, vertigo, a previous history of fall in the past three months, degree of alertness before fall, wet floor, lowered bed side rails, malfunctioning of emergency system. Large scale studies should be conducted in the future to establish the various factors contributing to falls over a longer period of time.

1. Introduction

Falls are known to be one of the most common inpatient adverse events[1] It is considered usually as a sensitive quality indicator in the delivery of inpatient services, and also one of the monitors used in the hospital programs that aim at improving and reading excellence in hospital structure[2]. It is important to emphasize that literature reviews used different definitions for falls, leaving the interpretation to the study participants. The most common one used in most of these literatures is that it is a sudden, unexpected decent from standing, sitting or horizontal position (including slipping from a chair to the floor, patients found down on the floor, and assisted falls) .[1,3,4]

Falls affect approximately 2% to 17% of patients during their hospital stay and fall rate varies from 1.4 up to 17.9 falls per 1000 patient days depending on hospital type and patient population.[5]

Falls can result in serious physical and emotional injuries, poor quality of life, increased length of hospital stay and increased costs, so in return many hospitals succeed to routinely report inpatient falls. **Fisher et al.,** reported that inpatient falls may lead also to permanent disabilities and even death [3] . In **Diccini**

et al., study, the fall rate was 23% among hospitalized patients which resulted in a wide array of lesions; 83% of these lesions were bruises, sprains and lacerations, while fractures represented about 9% [2] . Prevention of falls in the hospital setting is therefore an important patient safety and public health issue.

Hospital falls were found to be related usually to the patients characteristics plus some circumstances and activities which may facilitate these falls to occur such as; being over 65 years old, the level of patient's awareness, use of some medications, syncope and postural hypotension, bladder or bowel incontinence, balance disturbances, motor impairment, sensory impairment, lack of confidence in the environment and history of previous occurrence of falls [2] .

Hitcho et al., found that falls affected young as well as older patients. It was usually unassisted types and involved elimination related activities [1] .In 2005, another study was conducted retrospectively at the same hospital and reveled considerable variation in fall rates and percentages of fall related injury by services conducted [3] .In 2006, **Akihito Nakai** team at Tama-Nagayama Hospital in Japan demonstrated that there is a difference in the risk factors of inpatient falls among

the different clinical services such as internal medicine, surgery, pediatrics and others. The results suggested that fall prevention strategies should be linked to the patient characteristics and circumstances that cause a patient to fall [4].

Most research of falls has been conducted in elderly populations from the community and long-term-care facilities. Less is known about falls among hospital inpatients [6,7]. The majority of published inpatient fall studies are retrospective one which based mainly on data from medical records or incident reports while few are prospective. Information from risk management database studies is often incomplete and don't identify clearly potential causal factors for falls [1].

So, beside the sensitivity and the importance of the topic and due to lack of similar epidemiological studies in our community, this prospective study was conducted.

Aim of the study:
To describe the epidemiology of hospital inpatient falls in KING ABDULAZIZ UNIVERSITY HOSPITAL; including the magnitude of the problem, characteristics of patient who fall, circumstances of falls and fall-related injuries.

2. Methodology:
A prospective study was conducted at KING ABDULAZIZ UNIVERSITY HOSPITAL at Jeddah region, SA, for a period of 3 months started from Aug 1, 2009 through Oct 31, 2009. Patients included were those admitted to medical and surgical departments; both male & female wards with a total of 167 beds. Falls during physical therapy sessions or reported from psychiatry service were excluded.

Data collection started after approval of ethical research committee. The need for written informed consent from patients was waived because this study was part of hospital-based quality improvement project and posed no risk to patients. The study was performed by a detailed fall data collection questionnaire which was developed based on an extensive review of the literature and the fall protocol policy at KING ABDULAZIZ UNIVERSITY HOSPITAL to identify possible factors contributing to falls. The patients' medical records offered detailed information on the patient's medical history. A patient was considered confused or disoriented if the nurse documented the patient as not being alert to person, place, and time at the time of their fall.

The fall related variables in this reporting system include three categories of risk factors that are related to the patients characteristics, environment and nursing factors.

Risk factors related to the patient are age, gender, mental status prior to the fall (alert & oriented, or not), history of syncope, postural hypotension,

dizziness and vertigo, visual disturbance, bladder & bowel incontinence, balance deficit, hearing disturbances, osteoporosis, diabetes mellitus, hypertension, musculoskeletal problems, neurological problems, history of physiotherapy and previous history of fall in the last 3 months.

Risk factors related to the environment include easy reach to the belongs and call bell, presence of watcher, dim light, use of full-length side rails, uneven, wet or slippery floors, uncomfortable bed height, malfunctioning emergency call systems and availability of transfer aids in need.

Risk factors related to nursing include education about fall, preventive procedures and patient assistance to the bathroom.

In case of fall incidence, the patient who fell was interviewed by a trained nurse to assess the circumstances of fall regarding to: hospital stay duration, location (patient room, bathroom, others), time (7:00 am – 6:59 pm, 7:00 pm - 6:59 am), relation to any surgical operation, request of nurse assistance and his/her response to call, type of assistance received after fall (assurance, clinical examination, X-ray, other investigations, assign a watcher or none).

We consider a fall to have occurred if the patient was seen falling, was found on the floor, or reported having fallen (The few patients who fell more than once were counted only once). The operational definition of fall used in this study is the one mentioned earlier in the introduction paragraph.

Training session was held to provide the nurse staff with a solid knowledge about the purpose of the study and the structural questioner designed to collect the data suggested in the methodology which will be used to interview the inpatient that fell, a family member or a health staff. The data was collected in nearly daily base as regard the new admissions, the incidence of a fall taking in regard the occurrence of fall and number of patients/day.

The data was analyzed using SPSS for widows, version 15. Descriptive analysis and appropriate analytical tests were performed in form of Chi square test for the qualitative data and student t-test for quantitative one. Tests were two-tailed and a P value of < 0.05 was considered significant.

3. Results:
A total of 27 inpatients fell during the study period (representing 2.4% of all patients admitted between August 2009 through October 2009 and met our inclusion criteria (total =1115).

Demographics of the inpatients who fell were displayed in table (1). Those fallers were analyzed against non fallers to determine whether the two groups differed significantly regarding the studied demographics. Fall percent differed significantly (P<0.05)regarding the service. Medicine had the higher

percentage of fall than surgery (70, 4% vs. 29, 6%). Fallers were slightly younger on average than non fallers with mean age equal two 41.81 ± 18.15 and 48.61 ± 19.981 years, respectively. They were also more thinner with average BMI=22.7 ± 4.9 instead of mean=27.32 ± 7.8 in the other group the difference was statistically significant (P<0.05). Men were more likely to experience fall (53%) during study period than women (47%) but the difference was statistically insignificant (P>0.05). Most of the medical conditions studied were more prevalent among the fallers vs. non fallers but the significant difference was only observed as regard history of vertigo, syncope (P<0.05) and degree of alertness before fall , history of fall in the past three months (P<0.000).

Description of Falls: The largest proportion of patients fell in the evening or at night (14/27:51.9%), in patient's room (11/27:40.7%) (Table 2). Twenty one of fallers requested nurse help; of them 15 (55.6%) reported immediate nurse response while 5 reported late response and one patient reported no response at all. One of the 8 fallers with history of operation, 5

inpatients (62.5%) had no relation to the operation. Three patients of faller group (11.1%) received only assurance, while 20 (74.1%) fallers required an intervention (Table 2).

Environmental and Additional Circumstances of fall

Table (3) shows that approximately 15% of faller reported history of wet floor during their period of stay at hospital against only 3.4% among non fallers and the difference was statistically significant (P<0.05). A significant difference was also observed as regard the history of malfunction emergency bell (14% among fallers vs. 3.4% among non fallers) and presence of full length side rails (18.5% among fallers vs. 26.4% among non fallers).

Only 18.5% among fallers and 19.1% among non fallers reported that they received an educational message from the nurse about the hospital fall policy and the same percent among fallers received nurse assistance while in the bathroom against 17.4% among the non fallers and the difference between the two groups was insignificant (P> 0.05).

Table (1): Demographics & distribution of risk factors related to patients:

Characteristics	Total N=1115	Fallers N=27 (2.4%)	non fallers N=1088 (97.6%)	P
Ward:				
Medicine	560 (50.2%)	19 (70.4%)	541 (49.7%)	0.034
surgery	555 (49.8%)	8 (29.6%)	547 (50.3%)	
Mean age± (SD)	48.59 ±19.93	41.81± 18.151	48.61 ± 19.981	0.203
Mean BMI ±(SD)	28.37± 5.12	22.7± 4.9	27.32± 7.8	0.027
Gender:				
Male	591 (53%)	14 (51.9%)	577 (53%)	0.903
Female	524 (47%)	13 (48.1%)	511 (47%)	
Previous history of falls in the last 3 months	206 (18.5%)	14 (53.8%)	182 (17.6%)	0.000
level of alertness prior to fall:				
Non Alertness	35 (3.1)	6 (22.2)	29 (2.7)	0.000
-Syncope	129 (11.6%)	7(26.9%)	123 (12%)	0.023
-Postural hypotension	302 (27.1%)	9 (33.3%)	293 (29.5%)	0.485
-Faintness	190 (17%)	5 (18.5%)	185 (18.3%)	0.748
-Vertigo	299 (26.8%)	12 (44.4%)	287 (28.5%)	0.034
- Visual disturbance	433 (38.8%)	11 (40.7%)	422 (40.6%)	0.862
-Balance disturbances	387 (34.7%)	10 (37%)	377 (36.6%)	0.725
- Hearing disturbances	179 (16.1%)	5 (18.5%)	175 (17%)	0.828
-Incontinence	227 (20.4%)	5 (18.5%)	222 (21.7%)	0.923
- Osteoporosis	130 (11.7%)	7 (25.9%)	123 (13%)	0.121
- D.M	387 (34.7%)	11 (40.7%)	376 (35.5%)	0.472
- HTN	366 (32.8%)	10 (37%)	356 (34.1%)	0.537
- Musculoskeletal disorders	533 (47.8%)	14 (51.9%)	519 (48.1%)	0.565
-Neurological disorders	592 (53.1%)	16 (59.3%)	576 (53.4%)	0.295

Table (2): Description of Falls:

Description of Fall	N (%)
Fall location	
Patient room	11 (40.7%)
Bathroom	10 (37.0%)
Ward	1 (3.7%)
Others	5 (18.6%)
Time of fall	
7:00 am-6:59 pm	13 (48.1%)
7:00 pm-6:59 am	14 (51.9%)
Relation to operation (8 patients)	
6-24 hours post operative	2 (25%)
More than 48 hours post operative	1 (12.5%)
No relation	5 (62.5%)
Requesting nurse help	
Yes	21 (77.8%)
No	5 (18.5%)
Unknown	1 (3.7%)
Nurse response to call	
Immediate response	15 (55.6%)
Late response	6 (18.5%)
Intervention ordered	
Reassurance only	3 (11.1%)
Clinical examination	9 (33.33%)
X-ray	1 (3.7%)
Providing a "special visiting card"	1 (3.7%)
Multiple intervention	7 (25.9%)
Others*	2 (7.5%)
None	3 (11.1%)
Unknown	1 (3.7%)

*Others: health education, ECG.

Table (3): Distribution of risk factors related to environment & nursing:

Characteristics	Total N=1115	Fallers N=27(2.4%)	Non Fallers N=1088(97.6%)	P
-Absence of easy reach to belongs	254 (22.8%)	9 (33.33%)	245 (22.5%)	0.320
-Unreachable call bell	141 (12.6%)	5 (18.5%)	136 (12.5%)	0.648
-Absence of watcher	589 (52.8%)	13 (48.1%)	576 (52.9%)	0.780
-Dim light	120 (10.8%)	3(11.1%)	117 (11.4%)	0.070
-Lowered bed side rails	293 (26.3%)	5(18.5%)	288 (26.4%)	**0.037**
-Uneven floor	34 (3%)	1 (3.7%)	33 (3.2%)	0.830
-Wet floor	41 (3.7%)	4 (14.8%)	37 (3.4%)	0.002
-Uncomfortable bed height	52 (4.7%)	2 (7.4%)	50 (4.6%)	0.483
Malfunction of emergency bell	221 (19.8%)	7(25.9%)	214 (19.7%)	**0.021**
Presence of mobility aids in need	487 (43.7%)	8 (29.6%)	479 (44.1%)	0.136
Educational message about fall policy	212 (19%)	5 (18.5%)	207 (19.1%)	0.927
Assistance to bathroom	195 (17.5%)	5 (18.5%)	190 (17.4%)	0.885

4. Discussion:

This study documents the experience of inpatients fall and suggests that complex patient's characteristic, environmental and nursing factors may contribute to these falls. Fall frequency in our hospital was higher in the medical ward, which was consistent with Eileen study[1]. Patients in this service may have greater illness severity, longer stay periods, greater prevalence of balance and weakness problems or/and lower patients to nurse staffing ratios that could account for this significant association.

In agreement with **Fares et al.,**[7], the most important significantly associated risk factor for fallers was a previous history of fall; therefore, it might be beneficial to target this group during the prevention strategies. Among other risk factors were reported,

syncope and vertigo were significantly higher between fallers. This significance couldn't be compared with other studies [1, 2,4,7,8] due to either lack of data or the design of the study that couldn't elicit such as significant. Alertness has been documented as a risk factor for fall-related injures [1,3,7,8]. However, in our study, non alerted patients were more likely to fall as with **Diccini et al., 2006**[2]. This could be a result of patients with an altered mental status been less aware about the risk of falling and were less protected, and the fact that cognitive status was based on subjective assessment rather than assessment by standardized measures.

In the risk factors associated with hospital environment and nursing, both problems of structure and process were evaluated. Wet floor, lowered bed side rails, and malfunctioning of emergency system were all significant and indicated failure in the process of fall prevention, which it was also found in a recent study[2]. This can be explained by insufficient knowledge about fall prevention policy, a lack of commitment on the part of the physicians and nurses, or whether the high priority given to the acute care of treatment contributed to fall risk assessment protocol being neglected.

There were several limitations to this study. First, we couldn't determine what proportion of falls is not reported, nor which falls are more likely to go unreported. Second, patient-days were not available, which precluded the calculation of falls per 1000 patient-days (the more widely accepted metric for calculating fall rates). Third, the short duration of the study can only give us a hint about the risk factors and the process of prevention implementation. Forth, interpersonal variation in judgment could have substantial influence on the result. However, such differences in opinion are unavoidable in routine work, and occur also with more standardized questionnaire. Lastly, these findings are valid for patients in the medical and surgical wards only.

5. Conclusion:

Falls are not uncommon among hospitalized patients (2.4%) with various predisposing factors such as syncope, vertigo, degree of alertness before fall , previous history of falls in the past three months, wet floor, lowered bedside rails and malfunctioning of emergency system. Therefore, prevention effort can then be targeted to patients with previously mentioned risk factors.

Recommendation:

Large scale studies should be conducted in the future to establish the various factors contributing to falls over a longer period of time. Also, there is great need to understand the nature of inpatient falls and fall-related injuries. It is also important to ensure continuous education of nursing staff.

References:

1. Eileen B, Melissa J, Stanley Birge, William Claiborne, *et al.* (2004):Characteristics and circumstances of falls in a hospital setting. *J Gen Intern Med*; 19:732-739.
2. Diccini S, Pinho PG, Silva FO. (*2008):* Assessment of risk and incidence of falls in neurosurgical inpatients. *Rev Latinoam Enfermagem Julho-agosto*; 16(4):752-7.
3. Irene DF, Melissa JK, William C, Stanley B, Eileen H, Shirley J, Eileen C, Victoria JF. (2005): Patterns & Predictors of inpatient falls & fall related injuries in a large academic hospital. *Infection Control & Hospital Epidemiology.*; 26:822-827.
4. Akihito N, Masami A, Ikuno K. (2006): Incidence & risk factors for inpatient falls in academic acute-care hospital. *Nippon Med Sch*; 37:265-270.
5. Rene S, Hugo B, Sabina D, Koen M. (2006): Falls & consequent injuries in hospitalized patients: effects of an interdisciplinary falls prevention program. *BMC Health Services Research.*; 6:69.
6. Poster EC, Pelletier LR, Kay K.(1991): A retrospective cohort study of falls in a psychiatric inpatient setting. *Hosp Commun Psychiatry; 42:714-720.*
7. Fares S, Nava C, Arie O. (2008): A simplified Fall risk assessment tool for patients hospitalized in medical words. *IMAJ*; 10:125-129.
8. Melissa JK, Sheila LN, Claiborne D, Stanley B, Eileen H, Shirley J, Eileen C, Victoria JF. (2007): Circumstances of patient falls and injuries in 9 hospitals in Midwestern healthcare system. *Infection Control & Hospital Epidemiology*; 28:544-550.

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