Original Article

Fall-Related Injuries and Their Prevention Strategies of In-Patient Population in Tertiary Health Care Setup

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Abstract

Introduction: In-hospital falls are one of the major causes of morbidity and rarely mortality in India. Most horrible part is most of the times these are considered as "never happened events" and they are never recorded and recognised. Till now, there are only few documented studies, especially in the Indian setup regarding the study of fall-related injuries in hospital. **Aim:** The main aim of this study is the documentation and interpretation of context and characteristics of fall and fall-related injuries. Using internal communication system, in-built software, falls and fall-related injuries were documented. An extensive search was made to find out time and cause for the fall- and fall-related injuries. Many inbuilt programs were made to prevent and reduce fall- and fall-related injuries. **Results:** Most of falls and fall-related injuries occurred during the night and early morning times in wash rooms and toilets. Elderly people (60–89 years) and males had more incidence of falls compared to other age groups and females respectively. **Conclusion:** Falls and fall-related injuries in hospital can lead to significant secondary complications for individual patients. Since they are easily preventable, they represent an attractive target to increase the quality of care and lower the cost of overall medical treatment.

Keywords: Fall, patients, risk

Introduction

The safety of patients hospitalized in health services is one of the priority concerns in quality control systems. The falls suffered by the patients during their hospitalization period are one of the most important incidents in the interruption of safety and are often responsible for an increased stay in the hospital, increased hospital cost, and prolonged recovery. Hence, this has been a topic of research, studies, and interventions at health institutions.[1]

Falls are a public health problem worldwide. Hospitalization increases the risk of in-hospital falls because of the unfamiliar environment, illnesses, and treatments. Falls and fall-related injuries are devastating to patients, clinicians, and the healthcare system. A single fall may result in a fear of falling again and begin a downward spiral of decreased mobility, leading to the loss of function and greater risk of falls. Older adults are more likely to be injured from a fall. Injurious falls increase hospital costs and duration of stay.[2]

The World Health Organization (WHO) defines "A fall as an event which results in a person coming to rest inadvertently on the ground or floor or other lower level." According to the WHO, globally falls and fall-related injuries are a major public health problem. An estimated 646,000 fatal falls occur each year, making it the second leading cause of unintended injury death, after road traffic injuries. In all the regions of the world, death rates are the highest among elderly persons 60 years and above.[3]

Falls are usually considered a "*geriatric syndrome*," given its higher incidence in the elderly people and the major cause of accidental death among aged people. Falls in the hospital occur due to various reasons. The difference between the hospital and domestic environments, with their own movements and spatial

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and organizational alterations, can represent a great challenge, mainly for elderly patients or may face more difficulties to adjust to the changes in their environment. On the other hand, any modifications in the physical conditions of hospitalized people, whether related to disease or not, put them in a more delicate situation, which adversely affect physical as well as psychological functioning.[1,2]

Falls occur due to various reasons and associated with numerous risk factors. The risk factors are distinct, including impairments of gait and balance, visual disturbances, syncope and cardiac arrhythmias, polypharmacy, foot disorders, and environmental hazards.[4] The aim of the study is to analyze falls and provides appropriate strategies for the reduction of falls.

Objectives

- To find out the various type of fall-related injuries of in-patients and their prevention strategies in the tertiary care hospital and the risk involved
- To identify the causes and effects
- Analyze the intervention and develop the strategies to prevention falls occurs

Methodology

A quantitative, retrospective study was carried out from January 2018 to December 2018, in which we recorded incidents of patient's fall and related injuries in tertiary health care centre, using internal communication system, with inbuilt software. The investigation was carried out in a 450 bed tertiary care facility. The information gathered from January to December 2018. In order to deliver the highest level of patient safety care during this research period, the hospital management designed and executed fall prevention guidelines, standard operating procedures (SOPs), and initiatives.

We started by analyzing the data of this 2018 year for additional hospital improvements and outcomes of the findings also to fully understand and know the effect and outcome the of fall prevention guidelines, SOP's, and tactics.

Data analysis

Analysis is done by the descriptive statistics. During the study year, 15,651 patients were hospitalized out of which 25 fall incidence was reported. Day care patients and emergency department who were admitted for observation also included in this study. Outpatients excluded as well.

In our study, we analyzed the incidence of falls and fall-related injuries in all perspectives. Nearly 48% falls occurred in elderly people between 60 and 89 years. Adults between 30 and 59 years showed with 36% of falls, whereas only 16% falls were seen between 0 and 29 years of age group as shown in Graph 1.

Most of fall incidences documented in our study occurred during night and early mornings, time between 11 pm and 9 am. Thirty-six percent of cases happened the between 9 am and 6 pm which is during day time. Only 4% of cases observed fall during time between 6 pm and 11 pm [Graph 2].

The interesting facts regarding the gender, where in the male population is more prone for the fall incidences when compared to female. As per the Graph 3, it was observed that about 64% falls occurred in males, whereas on 36% of total falls occurred in females.

About more than 48% of the fall observed in the toilets/wash room during before and after elimination process and 44% fall near the bed side while getting down from the bed and about 4% fall observed in the hallways. Thirty-six percent fall incidences observed from bed and after/during elimination. 20% of the fall before and after bathroom activities. Eight percent of the fall observed during transfer [Graphs 4 and 5].

When we look about after effect sequences of falls, 36% of falls occurred in hospitalized patients resulted in minor injuries, mainly laceration, bruising, etc., about 8% falls resulted in fractures, whereas 56% of fall cases has no significant injuries, as shown in Graph 6.

When we look at which type/ward/unit wise patients experienced falls, 20% cases observed related to neurosurgery unit and 16% general medicine wards, 12% each in general surgery, neuro medicine, and nephrology wards. 8% each in cardiology, orthopedics wards and lastly 4% each in psychiatric, Obstetrics and Gynecology and Oncology units [Graph 7].

Percentage of increased Patient length of stay after the fall, Increased length of stay is reflected in graph 8 as a percentage. The average length of stay grew by 48% for stays of 0-3 days, 28% for stays of 4-7 days, 4% for stays of 8-11 days, and 8% for stays of 12-15 days.

Table 1: Increased length of stay after the fall

Number of days	Length of stay of patient after fall
0-3	12
4-7	7
8-11	4
12-15	2

Table 1 shows that here, out of 15,651 admitted patients throughout a 12-month period, the duration of stay for a total of 12 patients increased by 0–3 days, for 7 patients by 4–7 days, for 4 patients by 8–11 days, and for 2 patients by 12–15 days. In total, 25 patients' hospital days increased due to fall.

Interpretation of the study

Cause and effect diagram-1

Examined potential factors that were directly related to the fall. The effective implementation of the fall prevention techniques was made possible by this cause and effect diagram.

The following factors may also reason for the fall incidence and its related injuries:

- Restraints related myths in nursing – Neuropatients should not to be restrained-physical/chemical.
- Physical restraints are discontinued without clinician order.

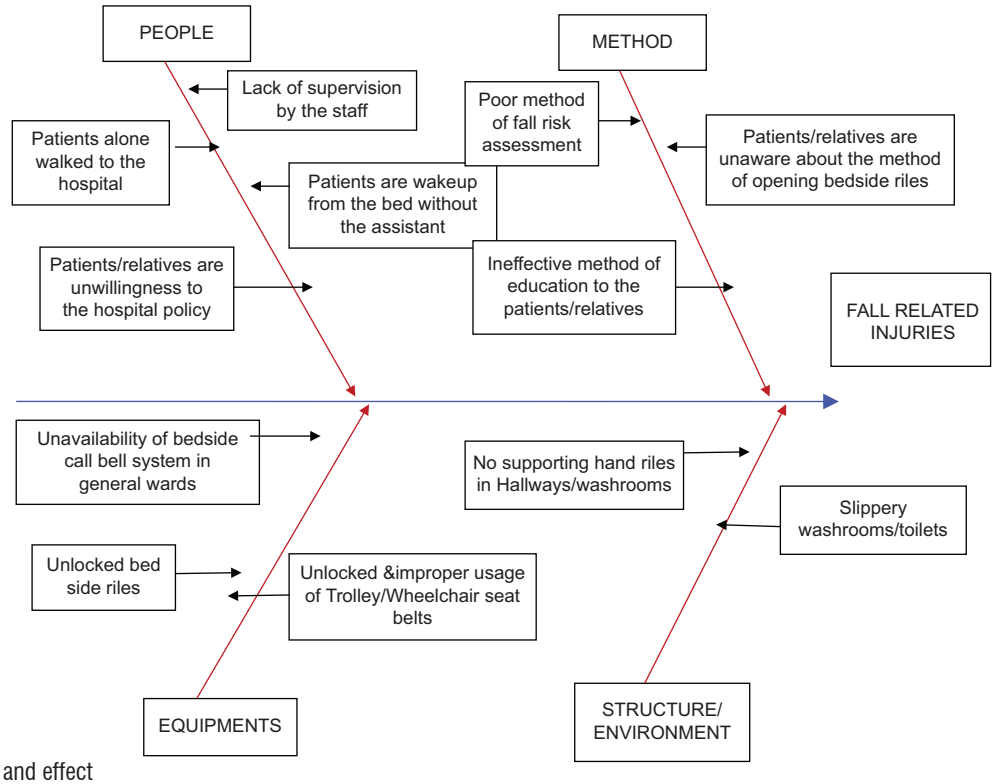


Diagram 1: Cause and effect

- Substance abuse not identified and treated.
- Hypoglycemia/medical condition
- No environmental risk assessment done
- No fall risk patient safety assessment done.

Corrective action

- Reference given to general surgery or other relevant departments
- Suturing of the wound is done
- On the job training and continuous training given to all the staffs, especially nursing staff, shifting personal on patient safety, and ED admission procedure by CNE (clinical nurse educator).

Discussion

Considering improving the safety of patients, first risk stratification was done using the Morse Fall Scale for adults and Humpty Dumpty Fall Scale for pediatric patients [Figure 1]. The assessment was done by qualified and trained nursing staff during the admission process as well as during any alterations in the clinical condition if required. The assessment report will be filled in fall assessment form that was developed internally by the nursing management team and nursing education department for future assessment and re-assessment.[5]

During assessment, every moderate to high fall risk patients is tagged ID bands with yellow color stickers Example of fall sticker as shown in the [Figure 2].[6] By this method, it would help nursing staff, that they can monitor these frequently so that incidences of falls can be minimized.

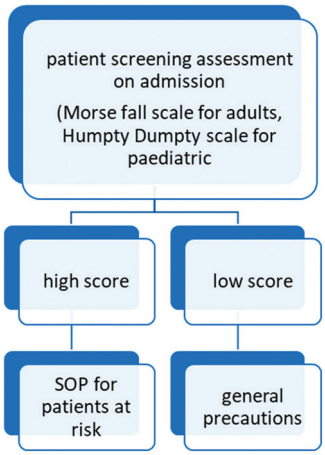
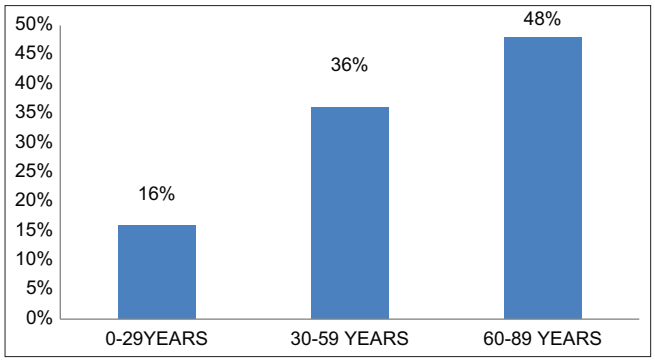


Figure 1: Screening process of the patients

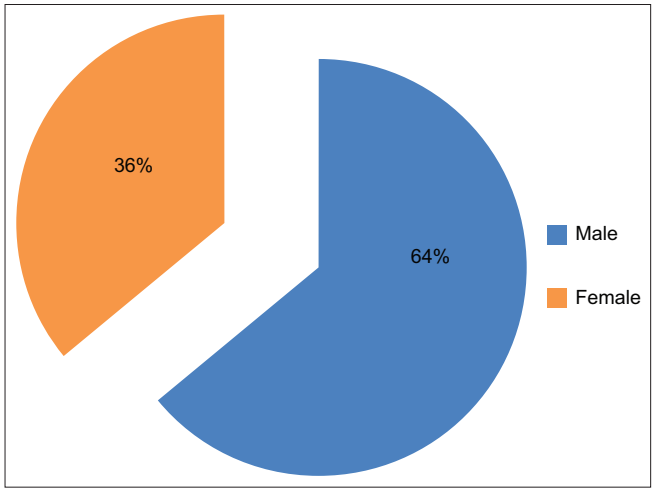
In our study, highest falls were noted in elderly patients between 60 and 89 years. In one study conducted in US, there were 31% falls in elderly people aged 65–74 and 39% falls between 75 and 84 years. Tsai *et al*. conducted a study in Taiwan which showed that 48.8% falls occurred in elderly people. Thus, elderly people are more vulnerable for falls due to multiple reasons.[7]

In some circumstances, the effects of inpatient falls may go beyond hospital settings (such as post-discharge need for community rehabilitation) and result in expenditures to the larger health and social care system.[8]

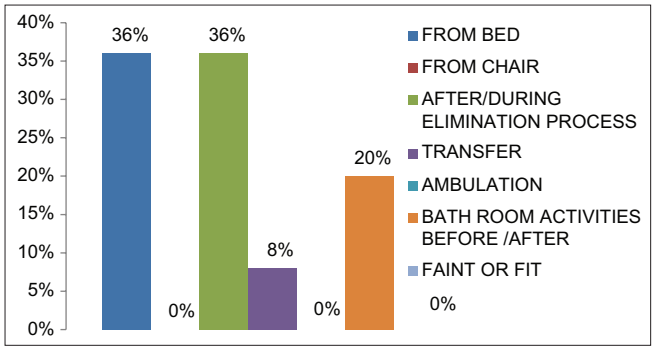
Falls are more common in males compared to females. In our study, 64% falls occurred in males as compared to 36% in



Graph 1: Variables related to the AGE group who are risk for fall



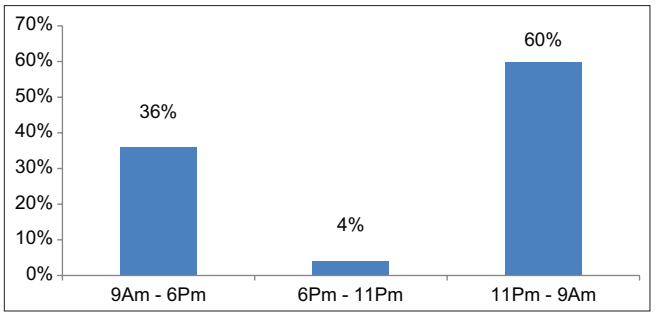
Graph 3: Variable related to GENDER



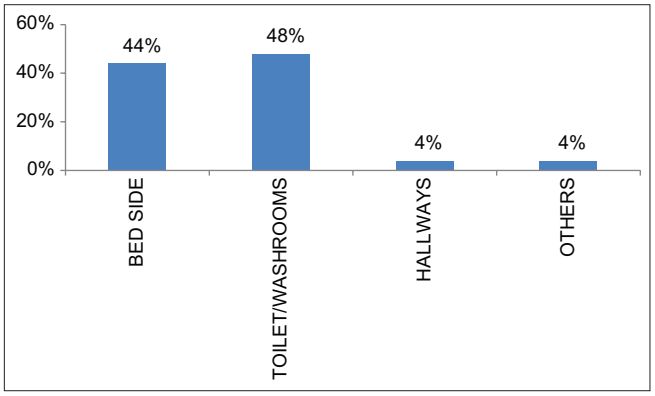
Graph 5: Variables related ACTIVITIES during which fall incidences observed

females. Our reports support the findings of Hendrich *et al*. that showed falls are more common in men than woman. However, Elley *et al*. and Cruz *et al*. in their studies showed that fall rates were more in women more than men.[9-11]

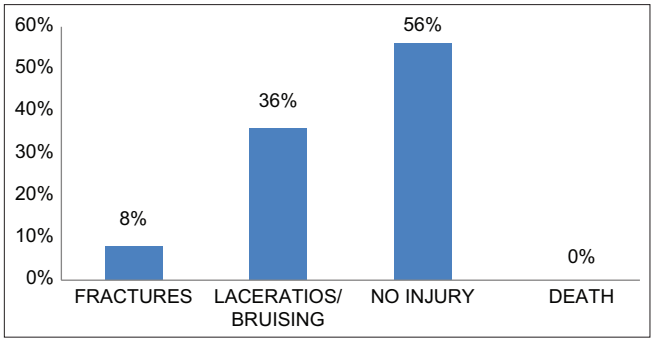
Most of the falls occur during late night and early morning hours (11 pm to 9 am). The highest number of falls occurred in toilets and washrooms. Our study supports the findings of Hitcho *et al*. that most falls occurred in night time this can be minimised by putting grab rails in the toilets to avoid slip and fall.[12] Most importantly, family members should be actively involved as



Graph 2: Variables related to TIME wherein the patients are prone to have fall



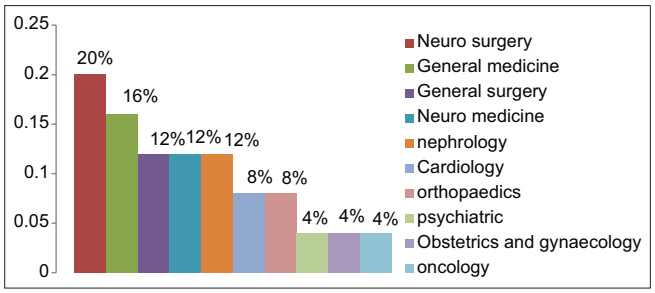
Graph 4: Variables related LOCATION of the event



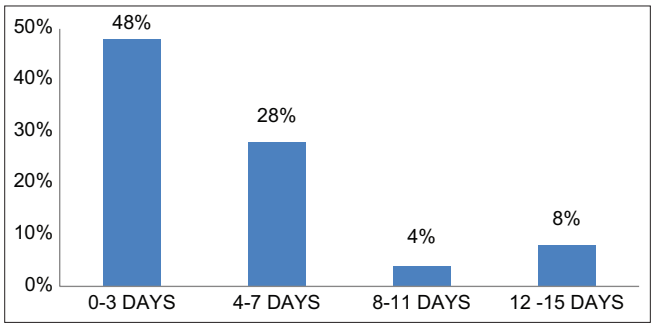
Graph 6: Variables related to INJURY after fall incidences observed

caregivers and encourage them to present round the clock along with nursing staff. Actively educate and engage patient and family in fall prevention strategies. Sign boards like "call for help" and "walk carefully, Don't Fall" must be placed near toilets and washrooms for awareness to patients and relatives.[13,14]

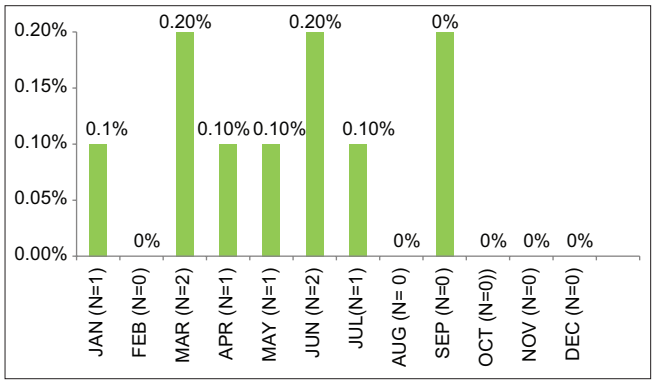
Falls may occur due to effect of drugs taken by the patients. Hence, patients taking medications should be monitored frequently by nursing staff and other in charge staff members. Nurse must be given adequate knowledge about these medications, so that they know which patients need extra care. High risk medications list should be made and displayed in all wards and this list should be updated frequently. Apart from these other general measures such as maintain adequate patient hydration may also help in. Adequate lighting in every wards, corridors, and washrooms may also help to mitigate falls.



Graph 7: Variables related to treating speciality



Graph 8: Percentage of increased Patient length of stay after the fall, Increased length of stay is reflected in graph 8 as a percentage. The average length of stay grew by 48% for stays of 0–3 days, 28% for stays of 4–7 days, 4% for stays of 8–11 days, and 8% for stays of 12–15 days



Graph 9: Variables related to TIME wherein the patients are prone to have fall, The 9 graphical representation shows that fall incidence are drastically reduced on the basis of followed prevention strategies. Continuous monitor of the patients and regular follow up of the prevention strategies will help to achieve 0% of fall incidences and also improve the quality of care to every patient in the health care centres

In our study, most of falls occur near beds, while getting up from the beds and moving around. Our study results are further supported by the reports of Hitcho *et al*. where more than 85% fall in patient room near the bed. This can easily be reduced by putting assistive devices such as call bells near beds, within reach of high-risk patients. Similarly, all the medications the patient should take should be kept near to the patient on the table. Patients must be advised to use protective footwear which can help him, especially in slippery areas. Walkers and canes also reduce the incidence of falls and fall-related injuries.

In our study, 56% of falls had no injuries, whereas 36% falls had bruising and lacerations. This further supports the findings of Fischer et al where 53.6% had no major injuries or just minor lacerations. This can be minimised by frequent supervision by nursing staff as well as family relatives.[15] In our study, most of falls were from medicine and neurosurgery ward patients. Our study reports are very similar to that study by Bradley where most of fall patients were from medicine and surgery units. This can be due to multiple reasons such as patients with medical wards have increased fall rates due to complex disease itself or may be due to effect of medication taken.

By identifying the root causes of previous falls, postfall studies actually prevent such incidents from occurring again. It analyses whether we should make major changes to our current SOPs and any modifications that must be done to lessen falls. They explore the underlying factors to the fall. It helps the clinician in addressing shortcomings in their treatments which may have produced falls.

In addition, the adoption of the postfall information required a care team to better understand their own responsibilities, such as clearly communicating with patients and other care staff members well about requirements and current condition of the patients.

Prevention strategies of fall risk

Nursing staff, who interact with the patients on day today basis and take initiative in preventing the falls and fall-related injuries. Therefore, nurses must be given adequate training and taught handling instruments to analyze the effect of specific actions and programs. Nurses must be trained regarding the importance of safety and quality in hospital wards and educated every SOP about how they can handle every high risk patients and allows best practices to be implemented both inside and outside hospital premises and report any immediate risk factors present in an institution.

Enough independence should be given for nursing staff, so that they can frame new methods as well as perform real-time assessments that can allow for the establishment of a culture of

Figure 2: Example of fall sticker[6]

safety. Safety of the patients should be given top most priority than applying SOP by the nursing staff in maintaining hospital integrity. Raising the awareness of an individuals' responsibility in preventing falls greatly decreases the probability of overlooking the key signs of a patient's risk of falling. Our hospital had started the patient screening assessment on admission to identify the fall risk and thereby the prevention of any fall-related injuries as shown as below process.

Fall risk assessment done/documented in the nursing stations during admission itself by the well trained nurse using Morse Scale and Humpty Dumpty Scale.

- Based on the scoring, patient will be classified as low risk, moderate, and high risk at the beginning itself.
- FALL STICKERS will be placed on ID band of all moderate and high risk for fall patients
- Actively educate, enlighten, and to include patients' relatives in fall prevention
- Nursing patients and family member's educational strategies and collecting patient relatives' consent.
- Patients with such a high risk for falls need to be monitored on frequently, at the very least every 2 h.
- Within an hour of the incident, fill out the incident form and notify the floor managers if there is a fall in the department.
- The 24-h grace period for the restraint policy modification: The intention of the restraint policy is to keep patients who are at risk of falling (vulnerable) from moving around. Restraint consent form amended with reasoning for releasing restraint. Consent to restrain patients is only valid for 24 h; in this study, Graph 4, it is shown that 44% of people who are getting out of bed fall close to the bed, which may have been caused by the release of restraints without professional authorization. Therefore, the patient or their family must be informed of the situation to minimize distress if constraint is withdrawn. The patients who are restricted need to be closely watched. On the advice of a doctor or medical practitioner, restraints should be removed. Staff, patients, and families received fall prevention education, and all nursing staff received training on the amended fall and restraint policy. Proposed: measuring tape for wall print height
- Rework the side rails of the trolley and conduct a periodic audit of the safety belts.

Outcome Results

After analysing the effectiveness of the outcomes of prevention techniques, a good outcome was discovered.

The 9 graphical representation shows that fall incidence are drastically reduced on the basis of followed prevention strategies. Continuous monitor of the patients and regular follow-up of the prevention strategies will help to achieve 0% of fall incidences and also improve the quality of care to every patient in the healthcare centers.

Suggestion

Increase both mortality and morbidity rates. From the perspective of health economics, falls and fall-related injuries in a medical context have broader negative impacts on patients and they further raise the financial burden of patients. Therefore, effective preventative tactics are essential. Finding patients who are most likely to suffer a serious injury from a fall, doing a multifactorial evaluation, and carrying out the essential interventions form the basis of preventative methods. India and other developing nations do not record the incidences, making it impossible to build the necessary measures to stop them from happening again in the future as other wealthy nations have already done. There must be systematic reporting of fall events. Provide are some interventions that can be used to prevent falls.

- Providing all patients with the proper nursing care, including educating them and their families; helping patients move around; and keeping the restrooms and floors clean. The patients should have convenient access to necessary materials
- Adequately monitoring patients who have undergone sedation or general anesthesia
- Regularly evaluating the patient's condition until a safe discharge, and offering the required supervision when the patient needs to be moved from one department to another and use the recommended safety precautions for all patient types to reduce the risk of fall-related injuries
- Adequately implementing the incident reporting system to strengthen the fall prevention plan and conduct an early risk assessment
- Establishing a well-organized healthcare system with simple access

Conclusions

In-hospital falls can lead to substantial secondary complications for individual patients. Most of falls and fall-related injuries can be prevented to a major extent by timely supervision with good teamwork of nursing staff as well as family members. Hence, this has gained a lot of attention of medical fraternity.

Every fall is different as each patient has to be studied from his disease point of view as well as circumstances encountered at the time of fall. Patient assessment should be individualized and rechecked frequently to find out what's reason for the fall so that necessary interventions can be set in point for future prevention. Quality improvement is a long unfinished ride and not an endpoint, so quality enhancement is a nonstop journey.

Our study showed that falls are multifactorial in origin, complexly interlinked so that we cannot come to pin point conclusion that this is the single prevention strategy. However, within the center of darkness like a ray of hope, by gradual implementation of preventive strategies with timely modification, we can prevent the falls and create friendly environment for patients. Our study can show light for clinicians as well as entrepreneurs of hospital about the

measures to train nursing staff about safety aspects and be an added value in care orientation, thus contributing to increase quality.

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Conflicts of interest

There are no conflicts of interest.

References

1. Abreu C, Mendes A, Monteiro J, Santos FR. Falls in hospital settings: A longitudinal study. Rev Lat Am Enfermagem 2012;20:597-603.
2. Roberts PS, Robinson MR. Occupational therapy's role in preventing acute readmissions. Am J Occup Ther 2014;68:254-9.
3. Available from: http://www.who.int/mediacenter/factsheets/fs344/en. [Last accessed on 2017 Dec 31].
4. Deandrea S, Lucenteforte E, Bravi F, Foschi R, La Vecchia C, Negri E. Risk factors for falls in community-dwelling older people: A systematic review and meta-analysis. Epidemiology 2010;21:658-68.
5. Currie L, Fall and Injury Prevention, Patient Safety and Quality: An Evidence-Based Handbook for Nurses., Columbia University School of Nursing; Agency for Healthcare Research and Quality (US); 2008.
6. Dustin, thelifelessonbook.com/er-waiting-room [Last accessed on 2022 Aug 29].
7. Tsai L-Y, Tsay S-L, Hsieh R-K, Yu S, Tsai J-M, Chien H-H, *et al.* Fall Injuries and Related Factors of Elderly Patients at a Medical Centre in Taiwan, International Journal of Gerontology, 2014;8:203-8.
8. The incidence and costs of inpatient falls in hospitals NHS 2017.
9. Hendrich AL, Bender PS, Nyhuis A. Validation of the Hendrich II Fall Risk Model: A large concurrent case/control study of hospitalized patients. Appl Nurs Res 2003;16:9-21.
10. Elley CR, Robertson MC, Garrett S, Kerse NM, McKinlay E, Lawton B, *et al.* Effectiveness of a falls-and-fracture nurse coordinator to reduce falls: A randomized, controlled trial of at-risk older adults. J Am Geriatr Soc 2008;56:1383-9.
11. Cruz DT, Ribeiro LC, Vieira Mde T, Teixeira MT, Bastos RR, Leite IC. Prevalence of falls and associated factors in elderly individuals. Rev Saude Publica 2012;46:138-46.
12. Hitcho EB, Krauss MJ, Birge S, Claiborne Dunagan W, Fischer I, Johnson S, *et al*, Characteristics and circumstances of falls in a hospital setting: a prospective analysis. J Gen Intern Med. 2004;19:732-9.
13. Joint Commission. Preventing falls and fall-related injuries in health care facilities. Sentinel Event Alert. 2015:1-5.
14. A Global Report on Falls Prevention (Sachiyo Yoshida – Intern Ageing and Life Course Family and Community Health World Health Organization)- 2008.
15. Fischer ID, Krauss MJ, Dunagan WC, Birge S, Hitcho E, Johnson S, *et al*. Patterns and predictors of inpatient falls and fall-related injuries in a large academic hospital. Infect Control Hosp Epidemiol. 2005;26:822-7.