Risk of Falling among Critically Ill Patients: Applying Prophylactic Nursing Strategies

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Abstract

Background: Critically ill patients are at increased risk of falls due to factors such as altered mental status, medication effects, mobility limitations, and environmental hazards. Falling can lead to significant morbidity, prolonged hospital stay, and increased healthcare costs. **The study aimed to** evaluate the effect of applying prophylactic nursing strategies on reducing the risk of falling among critically ill patients. **Research design:** A quazi experimental research design (study-control) was utilized. **Setting:** This study was carried out in the tropical intensive care unit (ICU) at main Minia university hospital, Minia city, Egypt. **Sample:** A purposeful sample of 86 critical ill patients divided equally into study and control groups. **Tools: Tool I:** An interview questionnaire sheet consisted of three parts: **Part 1**: Demographic data, **Part 2:** Medical data and **Part 3**: level of consciousness assessment. **Tool II:** Morse fall scale (MFS) Assessment. **Tool III:** Patient outcomes assessment sheet. **Results**: Shows that only 7% of the study group had experienced fall with a minor injury as compared to 16.3% of the control group post implementation of the prophylactic nursing strategies with statistical significant difference found between the two groups. Regarding length of hospital stay, the findings reflected that 79.1% of the study group stayed less than 5 days in hospital, versus 46.5% of the control group with high statistical significant difference detected between both groups. **Conclusion:** Prophylactic nursing strategies significantly reduced the risk of falls among critically ill patients of the study group as compared to the control. **Recommendation**: Further studies are needed to explore long-term effects of these interventions and their impact on various patient populations within critical care environments.

Key words: Critically ill patients, Nursing strategies, Prophylactic, Risk of fall.

Introduction

Falls occur when a body moves unintentionally to the ground. It is worth mentioning that hospitalization can increase fall risk, since the environments are not familiar and hospitalized people may have diseases or suffer multiple therapeutic interventions that may predispose to falls **(Sena et al. 2021)**.

Patient falls in critical care settings are unintended descents to the ground or lower surfaces that occur in intensive care units (ICUs). These falls may be assisted, where a healthcare provider helps the patient, or unassisted, which cause a higher risk of injury. Critically ill patients are particularly vulnerable due to factors such as muscle weakness, cognitive impairment, and hemodynamic instability. Unlike general hospital falls, ICU falls are more complex due to medical devices like IV lines, catheters, and ventilators **(Gydan, Ahmed, & Ibrahim, 2023).**

Fall prevention in ICUs is essential for ensuring patient safety, as critically ill patients are highly vulnerable to fall-related injuries due to their unstable medical conditions. Falls can lead to serious complications, including fractures, head trauma, internal bleeding, and extended hospital stays. Since ICU patients often experience delirium, sedation effects, and muscle weakness, even minor falls can result in significant harm. Preventing falls not only reduces patient morbidity and mortality but also enhances overall recovery and rehabilitation outcomes. Effective prevention strategies help maintain patient stability and improve healthcare quality **(Innab, 2022)**

Nurses are at the forefront of patient care and play a crucial role in identifying, managing, and mitigating fall risks. Their continuous presence, ability to assess patients regularly, and involvement in daily activities position them as key agents in fall prevention. Through comprehensive risk

assessments, individualized care plans, and education initiatives, nurses help create safer environments and promote patient mobility **(Alrasheedi et al. 2024)**

Critical care nurses are essential in developing, implementing, and reinforcing fall prevention protocols to enhance patient safety in the ICU. Standardized fall prevention strategies typically include comprehensive risk assessments, individualized care plans, early mobilization programs, and environmental modifications**.** Nurses ensure that these protocols are consistently applied by conducting regular patient screenings, adjusting fall prevention measures as needed and educating staff on best practices (**Kim et al. 2022)**.

Significance of the study:

Falls represent a significant threat to patient safety in clinical settings and can lead to severe complications and death. The World Health Organization (WHO) estimates that around 646,000 fatal falls occur every year, making falls the second leading cause of death worldwide, also estimated that 37.3 million falls are severe enough to require medical care. Falls have been identified as a priority issue among hospitalized patients and can result in a prolonged hospital stay as well as increased healthcare costs **(Innab, 2022)**

Nationally, fall rates and outcomes in large part determine government subsidies, oversight, and penalties as well as the customer's perception of care. Locally, fall rates affect a facility's budget, staffing, and morale. Hospital falls lengthen the average patient's length of stay and increases the chance of both patient and staff injury. Fall injuries negatively affect the patients, the staff, and the organization **(Camaya, 2021)**

Aim of the study:

The study aimed to evaluate the effect of applying prophylactic nursing strategies on reducing falling among critically ill patients.

Hypothesis:

To fulfill the aim of the study, it was hypothesized that the critically ill patients who exposed to the prophylactic nursing strategies will have a lower risk of falls during ICU stay than the control group.

Subjects and methods

Design: A quasi - experimental research design (study-control) was utilized to fulfill the aim of this study.

Setting: This study was carried out in the tropical intensive care unit (ICU) at Main Minia University Hospital, Minia City, Egypt.

Study duration:

The current research data was collected over duration of six months with frequency of three days a week started from November 2023 to the end of April 2024.

Sampling: A purposeful sample of 86 adult critically ill patients was utilized in the current study.

The sample size was calculated based (**Slovin, 1960**) Formula which was computed as:

n = N / (1+Ne2)

Whereas:

n = size of the sample

N = total personnel

e = desired error margin

n= 110 / [1+ (110) (0.05)2 = 86

Study group 43 patients + 43 patients for control group

Inclusion criteria: Participants eligible to the allocated study if they have the following inclusion criteria:

- Adult patients (18 -60) years
- All critically ill patients of both sexes who have one or more of the following:
  - Visual impairment
  - Impaired extremities
  - Muscle weakness
  - Gait disturbance
  - Taking analgesics
  - Taking narcotics
  - Taking psychotropic medication
  - Taking antihypertensive medication
  - Central nervous system disease
  - Requiring mobility assistance

Exclusion Criteria

If participants had one or more of the following criteria, they were excluded from the current study:

- Patients whose length of hospital stay is less than 48 hours.

- Patients on mechanical ventilation.

Data Collection Tools: Three tools were used for data collection:

First Tool: **Interview Questionnaire Sheet**: used to evaluate demographic and medical data for the patients, based on related literature (**Morton & Fontaine 2018)**, this tool filled by the investigator and included three parts:-

- **1st Part: Demographic data** as age, gender, level of education & occupation
- **2nd Part: Medical data** as diagnosis, date of admission, and date of discharge, presence of comorbidities, Body mass index (BMI)
- **3rd Part: level of consciousness assessment**: assessed by using Glasgow Coma Scale

Second Tool: Morse fall scale (MFS) Assessment adopted from (Morse et al., 1987)

Morse fall scale is a screening tool to identify patients at high risk of fall. It composed of 6 subscales where each subscale identifies situations that put patients at higher risk for falls. The subscales are "History of falling, Secondary diagnosis, Ambulatory aid, IV/saline lock, Gait/transferring and Mental status"

Scoring system: The total possible score on the MFS is 125:

- **Low Risk: < 25**
- **Moderate Risk : 25 – 45**
- **High Risk: > 45**

Third tool: Patient Outcomes Assessment Sheet: adopted from (Wu et al., 2021):

- The primary outcome measure is fall incidence in ICU.
- Secondary outcomes: Includes ICU length of stay (LOS)
- Tertiary outcomes: The severity of injuries resulting from falls

Validity and Reliability

Validity was ascertained by a panel of 3 experts in the branch of critical care nursing and medical surgical nursing, faculty of nursing, at Minia University. The assessment focused on content coverage, clarity, relevance, applicability, wording, length, format, and overall appearance of the tools. According to the expert opinion all modifications were done.

Reliability for the study tools was estimated using the Cronbach's Alpha test to measure their internal consistency to evaluate how well the tools consistently measure, what they were designed to measure. It was (0.78) for the first tool, (0.87) for the second tool, and (0.70) for the third tool.

Pilot Study

The pilot study was conducted on 10% of sample (9 patients) after obtaining the ethical approval and permission from hospital director in order to check the clarity of items, feasibility and applicability of the determent tools. No modifications were done and the number of patients was included in the study.

Ethical Consideration

An official permission to conduct the study was obtained from the ethical committee of the Faculty of Nursing, the dean of the Faculty, the Minia University Hospital director, and the critical care unit director. Subjects' participation in our study was voluntary, and they were informed about the nature and purpose of the study. Also, they had the right to withdraw at any time without explanation. Added to, oral and written consent was obtained from subjects (or their relatives) those who accepted to participate in this study, informing them that obtained data would not be included in any further research without a second consent. The confidentiality and anonymity of each subject were ensured by coding all data and protecting the obtained data.

Study procedure

Preparatory phase:

It included reviewing of the current and relevant related literature and theoretical knowledge of the various related aspects using textbooks, articles, and periodical magazines. Also, obtaining a formal paper agreement which was taken in duration about one-month duration before conducting the study and ended by carrying out the pilot study

Implementation phase:

The investigator started data collection in the tropical intensive care unit (ICU) at Main Minia University Hospital from control group using the first and second study tools which took about 15-20 minutes firstly (after 24 hours of admission), then from the study group. The third tool used only one time after 7th days for both groups as an evaluator tool. For the control group, no intervention was done for the patients and the patient received care according to the hospital policies.

For the study group, data collection applied using the same first and second study tools which took about 15-20 minutes, after that, the prophylactic nursing strategies were done over a period of six day for each patient individually. They developed by the investigator based on related literature **(Zhao et al., 2019), (Mitra et al., 2019) and (Dykes et al., 2021):** which included the following:

1. All patients admitted to acute care settings should undergo falls risk assessment at the point of admission.
2. Orientate patients to the hospital environment
3. Monitor patients closely (e.g. moving patients near to nurses' station, involving family members to sit with patients)
4. The patient bed should be in low position
5. Raise the side rails for all patients. Patient and family should be informed and educated on need to raise side rails.
6. Safety first signage to be appropriately placed as applicable
7. keep call bells within patient's reach
8. Apply restraints whenever clinically indicated.
9. Provide patients with appropriate transfer assistance
10. Patients at risk of falls should be assisted with transfers and mobilization.
11. Instruct Patients to stand up slowly
12. Patients should be supported during turning, moving and positioning
13. Patients should use well-fitted, non-slip footwear when ambulating
14. Use safety belts on wheelchairs when transporting patients.
15. Use sturdy chairs which have arm rests and are of appropriate height for rising and sitting
16. Toilet and Nutritional needs of the patient must be met
17. Enquiring about their elimination needs routinely, and offer appropriate toileting aids (e.g. urinal or commode).
18. Placing patients with urgency nearer to the toilets.
19. Checking on patients receiving laxatives and diuretics for their elimination needs.
20. Keep the Floors of the ward and toilet dry.
21. Educate the patient not to walk holding the food or other objects
22. Grab bars should be located properly in toilets and bathroom.

Evaluation phase:

- The first evaluation will be done at 2nd day from admission by using the first and second tools as base line data (Patient Assessment Sheet and Morse fall scale assessment) for both groups.
- Then Posttest was done at the 7th day post implementation of the prophylactic nursing strategies by using the second and third tool.

Statistical Analysis:

The data was tabulated and analyzed by using SPSS (statistical package for the social science version (22) for statistical analysis of data. Numerical data were expressed as mean & SD. Qualitative data were expressed as frequency and percentage. Chi-square test used as a way to test the association between two categorical variables. A t-test is an inferential statistic used to determine if there is a significant difference between the means of two groups and how they are related. Correlation coefficient was done by using Pearson correlation test. P-value less than 0.05 were considered significant. The smaller P-value obtained, the more significant is the result less than 0.001 considered highly significant.

Results

Table (1): Percentage distribution of Study and Control Group Regarding their Demographic Data (n = 86)

Data	Study (n=43)		Control (n=43)		X^2	P-value
	No.	%	No.	%		
Age						
18 < 30 years	9	20.9	5	11.6	3.08	0.379
30 < 45 years	3	7	7	16.3		NS
45 < 55 years	7	16.3	9	20.9		
55- 60 years	24	55.8	22	51.2		
Mean ± SD	42 ± 15.5		48.8 ± 12.5		0.640	0.524 NS
Gender						
Male	24	55.8	22	51.2	0.187	0.665 NS

Data	Study (n=43)		Control (n=43)		X^2	P-value
	No.	%	No.	%		
Female	19	44.2	21	48.8		
Education						
Illiterate	6	14	13	30.2	5.23	0.156 NS
Read & Write	7	16.3	7	16.3		
Secondary	29	67.4	20	46.5		
University or higher	1	2.3	3	7		
Occupation						
Employed	16	37.2	12	27.9	0.847	0.357 NS
Unemployed	27	62.8	31	72.1		

Ns: Not Statistical Significant

Table (1): Shows that more than half of the study & control group aged between 55- 60 years old. As regards sex, 55.8% and 51.2% of both groups respectively were males; also, it was found that 67.4% of study group and 46.5% of the control group had a secondary education. In addition, the findings represented that, 62.8% & 72.1% of study and control groups were unemployed.

No statistical significant differences were found between the study and control groups regarding their demographic data.

Table (2): Comparison between the Study and Control Group Regarding their risk of falling by using Morse Fall Scale at pre and post implementation of prophylactic nursing strategies (n = 86)

Data	2nd day		7th day	
	Study (n=43)	Control (n=43)	Study (n=43)	Control (n=43)
	No	%	No	%
History of Falling				
Yes	3 (7)	6 (14)	3 (7)	6 (14)
No	40 (93)	37 (86)	40 (93)	37 (86)
X^2 (p value)	5.68 (0.110)		5.68 (0.110)	
Secondary Diagnosis				
Yes	16 (37.2)	18 (41.9)	16 (37.2)	18 (41.9)
No	27 (62.8)	25 (58.1)	27 (62.8)	25 (58.1)
X^2 (p value)	0.195 (0.659)		0.195 (0.659)	
Ambulatory Aid				
Bed rest/nurse assist	25 (58.1)	20 (46.5)	30 (69.8)	17 (39.5)
Crutches/cane/walker/wheelchair /needs assistance	12 (27.9)	19 (44.2)	10 (23.3)	17 (39.5)
Using furniture	6 (14)	4 (9.3)	3 (7)	9 (20.9)
X^2 (p value)	2.52 (0.281)		8.41 (0.014*)	
IV/Saline Lock				
Yes	43 (100)	43 (100)	8 (18.6)	2 (4.7)
No	0 (0)	0 (0)	35 (81.4)	41 (95.3)
X^2 (p value)	----------		4.07 (0.044*)	
Gait/Transferring				
Normal/bed rest/immobile	14 (32.6)	13 (30.2)	24 (55.8)	13 (30.2)
Weak	25 (58.1)	22 (51.2)	16 (37.2)	19 (44.2)
Impaired	4 (9.3)	8 (18.6)	3 (7)	11 (25.6)
X^2 (p value)	1.53 (0.479)		8.02 (0.022*)	
Mental Status				
Oriented to own ability	39 (90.7)	37 (86)	39 (90.7)	31 (72.1)
Forget limitations	4 (9.3)	6 (14)	4 (9.3)	12 (27.9)
X^2 (p value)	0.453 (0.501)		4.91 (0.027*)	

* Statistical significant difference (P ≤ 0.05) ** Highly Statistical Significant Difference (P ≤ 0.01)

Table (2) illustrates that 93% of study group compared to 86% of the control group hadn't any history of falling at 2nd and 7th day of observation. Regarding secondary diagnosis, it was found that 62.8% & 58.1% of the control group hadn't any comorbidity at 2nd and 7th day of observation. Also, the table represents that 58.1% & 46.5% of study and control group respectively were bed rest/nurse assist at the 2nd day of observation compared to 69.8% & 39.5% of them were bed rest/nurse assist at the 7th day of observation

Regarding IV/Saline lock, it was found that all studied participant had IV/Saline lock at the 2nd day of observation while 18.6% and 4.7% of study and control group respectively. in relation to gait/transferring, it was cleared that 58.1% & 51.2% of study and control suffering from weakness at the 2nd day compared to 37.2% & 44.2% of them suffering from weakness at the 7th day

Finally, it was observed that 90.7% & 86% of study and control group were oriented at the 2nd day compared to 90.7% & 72.1% of study and control group were oriented at the 7th day.

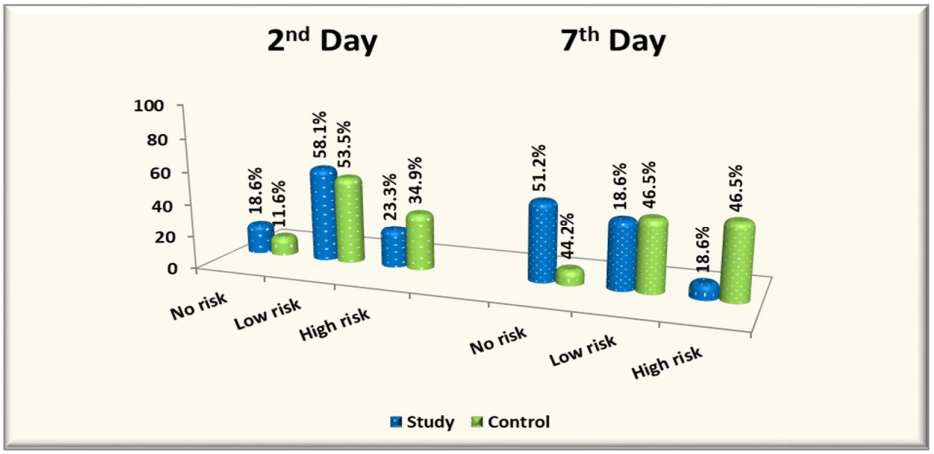

Figure (1): Comparison between the Total Score of Falling Risk by Using Morse Fall Scale among the Studied patients at pre and post implementation of prophylactic nursing strategies (n = 86)

Figure (1) clarified that 23.3% & 34.9% of study and control group had a high risk for falling at the 2nd day while after the implementation of the prophylactic strategies only 18.6% of the study group versus 46.5% had a high risk at the 7th day of hospitalization. This result answered the research hypothesis.

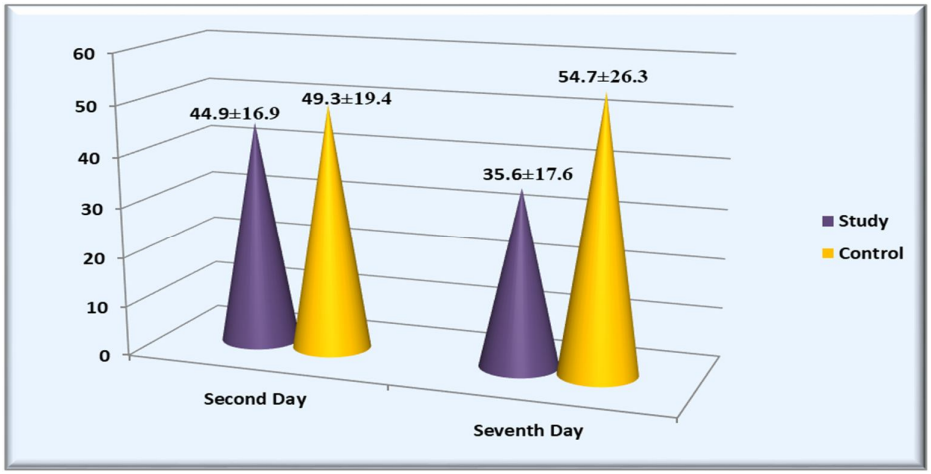

Figure (2): Total Mean Average Score of Falling Risk by Using Morse Fall Risk Scale among the study and control group before and after implementation of prophylactic nursing strategies (n = 86)

Figure (2) clarified that the mean score Morse fall scale for the study group was 44.9 at the second day which decreased to 35.6 after implementing the nursing strategies, compared to 49.3 for control group at the 2nd day that increased to 54.7 at the 7th day after implementing the nursing strategies.

Table (3): Comparison between the Study and Control Group Regarding patients' outcome after implementing nursing strategies (n = 86)

Patient's outcomes	Study (n=43)		Control (n=43)		X^2	P value
	No	(%)	No	(%)		
Presence of falling						
None	40	93	31	72.1	7.53	0.019*
Minor	3	7	7	16.3		
Moderate	0	0	5	11.6		
Length of hospital stay						
< 5 days	34	79.1	20	46.5	9.75	0.002**
> 5 days	9	20.9	23	53.5		

* Statistical significant difference (P ≤ 0.05) ** Highly Statistical Significant Difference (P ≤ 0.01)

Table (3) represents that 7% of study patients had experienced of fall with a minor injury versus 16.3% of the control group had experienced fall with minor injury and 11.6% had a moderate injury after falling post implementing the nursing strategies with statistical significant difference found between the two groups.

Regarding length of hospital stay, the table shows that 79.1% of the study group stayed less than 5 days in hospital, in contrast 46.5% of the control group stayed more than 5 days in hospital. With high statistical significant difference found between the two groups.

Table (4): Relation between Study and Control Group Demographic data and risk of falling assessed by Morse fall Scale after implementing nursing strategies (n = 86)

Data	Study (n=43)			Control (n=43)			X^2 P-value
	No (n=21)	Low (n=18)	High (n=4)	No (n=4)	Low (n=19)	High (n=20)	
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	
Age							
18-30 years	5 (23.8)	4 (22.2)	0 (0)	0 (0)	2 (10.5)	3 (15)	8.77 (0.049*)
30- 44 years	1 (4.8)	2 (11.1)	0 (0)	1 (25)	4 (21.1)	2 (10)	
45- 54 years	4 (19)	2 (11.1)	1 (25)	1 (25)	3 (15.8)	5 (25)	
55- 60 years	11 (52.4)	10 (55.6)	3 (75)	2 (50)	10 (52.6)	10 (50)	
Gender							
Male	13 (61.9)	9 (50)	2 (50)	1 (25)	10 (52.6)	11 (55)	0.282 (0.959)
Female	8 (38.1)	9 (50)	2 (50)	3 (75)	9 (47.4)	9 (45)	
Education							
Illiterate	1 (4.8)	4 (22.2)	1 (25)	1 (25)	9 (47.4)	3 (15)	13.6 (0.034*)
Read & Write	4 (19)	2 (11.1)	1 (25)	0 (0)	1 (5.3)	6 (30)	
Secondary	16 (76.2)	11 (61.1)	2 (50)	3 (75)	8 (42.1)	9 (45)	
University or higher	0 (0)	1 (5.6)	0 (0)	0 (0)	1 (5.3)	2 (10)	
Occupation							
Employed	10 (47.6)	4 (22.2)	2 (50)	0 (0)	4 (21.1)	8 (40)	4.60 (0.093)
Unemployed	11 (52.4)	14 (77.8)	2 (50)	4 (100)	15 (78.9)	12 (60)	

* Statistical significant difference (P ≤ 0.05) ** Highly Statistical Significant Difference (P ≤ 0.01)

Table (4) illustrates a statistical significant relations were found between study and control groups' age, education and risk of fall post implementation of prophylactic nursing strategies. On other hand, there was no statistical significant relation between risk of fall post implementing nursing strategies with study and control groups' gender and occupation.

Discussion

Falls are a significant clinical, legal, and regulatory problem, moreover, is considered one of the nursing-sensitive quality indicators and essential goal of international patient safety goals IPSG. Falls are the most frequently reported incidents among hospitalized patients. It is considered a challenge for healthcare workers because information on effective fall reduction is lacking **(Elbasiony et al. 2021)**

Fall prevention is the main concern among healthcare institutions since providing quality and safe care is their primary goal. As healthcare systems continue to adopt and implement fall prevention strategies, nurses play a critical role in implementing fall prevention procedures in the acute care setting **(Gydan, Ahmed, & Ibrahim, 2023**). So that the current study aimed to evaluate the effect of applying nursing strategies for reducing the risk of patient's fall in critical care units.

As regard to demographic characteristics among the studied sample, the current study showed that more than half of both study and control group' age was above fifty-five years old. From the researcher point of view, older adults are more likely to experience muscle weakness, decreased balance, cognitive impairment, and sensory deficits, all of which significantly increase the likelihood of falls in ICU settings.

This finding is consistent with **(Matzkanin, 2022)** who assessed "Fall Prevention in the Cardiac Critical Care Unit: Enhancing Multidisciplinary Communication" they found that most of study participants aged more than fifty years. And **(Cheng et al. 2022)** found that high percentage of study sample aged sixty-five years or older.

As regards gender, the current study findings showed that more than half of study sample were males. This may be rendered to males, particularly older men, often have higher rates of chronic conditions such as cardiovascular disease, diabetes, and neurological disorders, which can contribute to muscle weakness, impaired balance, and reduced mobility—all of which increase fall risk. Additionally, men may exhibit greater physical strength but lower flexibility compared to females, which can affect their ability to recover from postural instability.

*This finding was similar to the study conducted by (***Cheng et al. 2022)** *who concluded that more than half of study participants were males.* Also the current study finding was compatible with the study conducted by **(Jewll et al. 2020)** who studied "Prediction of Falls in Acute Care Using The Morse Fall Risk Scale" they found that about three fifth of study participants were males.

Concerning Education, the current study results displayed that the highest percentage of study sample had secondary education degree. This result is in line with **(Wu, et al. 2022)** who reported that about half of study participants had intermediate educational degree. Regarding to occupation, the present study findings illustrated that about two thirds of study participants were not employed. This finding is consistent with **(Wu, et al. 2022)** who concluded that more than half of study sample didn't work

Regarding history of falling, the current study findings showed that the highest percentage of study participants hadn't any history of fall. This finding is consistent with **(Choi, et al. 2017)** who found that the minority of study sample had history of fall during last three months. The current study was opposite to the study conducted by **(Dykes, et al. 2020)** entitled "Evaluation of a patient-centered fall-prevention tool kit to reduce falls and injuries: a nonrandomized controlled trial." They found that most of study sample had history of falling before.

Regarding to using ambulatory aid, the present study findings found that more than half of study group compared with less than one quarter of control group were bed rest/nurse assist. This finding was consistent with **(Dykes, et al. 2020)** who found that most of study sample were nurse assisted. Also, **(Choi, et al. 2017)** reported that the vast majority of study participants were bed rest.

Regarding to IV/Saline Lock, the current study findings found that all studied participant had IV/Saline lock at the 2nd day of observation. The current study finding was compatible with the study conducted by (Lee et al. 2022) who found that more than half of study sample had IV therapy/Heparin lock. Also, (**Rodrigues et al. 2021**) reported that more than four fifth of study sample used intravenous devices.

Related to gait, the current study findings found that more than half of study and control groups suffering from weakness. The current study finding was contradicted with the study conducted by **(Choi, et al. 2017)** whose study illustrated that more than two thirds had Normal/bedrest gait. Also, **(Cho, Lee, & Youn , 2019)** concluded that more than half of study participants had normal gait.

Regarding to mental status, it was observed that the vast majority of study participants were oriented to own ability. The current study finding

was compatible with the study conducted by **(de Oliveira Silva et al. 2023)** whose study findings displayed that the majority of study sample were oriented. Also, **(Cai et al. 2025)** reported that the highest percentage of study participants were alert and oriented.

Concerning comparison between study and control group regarding total score of Morse fall scale used for assessing risk of fall among studied patients, it was noticed that less than tenth of study group compared to nearly half of control group had high risk of falling after implementing the nursing strategies. The higher proportion of high-risk patients in the control group suggests the impact of routine care alone may not be sufficient to mitigate fall risks in ICU settings. These results reinforce the importance of implementing prophylactic nursing strategies in effectively reducing fall rates and enhancing patient safety. It also underscores the need for ongoing assessment and tailored fall prevention plans to address the dynamic nature of patients' conditions in critical care environments.

*This outcome was similar with the study conducted by (***Kim et al. 2022)** *who reported that* the use of the targeted interventions is effective in identifying and reducing fall risk in hospital settings. Also, (Ali Ibrahim et al. 2023) clarifies there was no significant difference between study and control group on admission. While after two weeks nearly half and less than one-third of control and study group were at high risk with statistically significant difference between both groups at $p \leq 0.05$.

Regarding to comparison of study and control group regarding patient outcome after implementing nursing strategies, it was noticed that study patients had experienced of fall with a minor injury less than the control group with high statistical significant difference found between the two groups. *On the same line the study finding was similar to study conducted by (***Dykes, & Hurley, 2021).** They highlight that approximately one third of inpatient control group falls result in injury, leading to increased morbidity, mortality, and healthcare costs. Also, the study by **(Mayhob, & Amin, 2022)** revealed that participants receiving routine interventions were 1.3 times more likely to experience a fall compared to those who received the personalized, patient-centered strategies

Regarding length of hospital stay, the study findings showed that more than two thirds of the study group stayed less than five days in hospital, in contrast less than half of the control group stayed more than five days in hospital. With high statistical significant difference found between the two groups. This result was confirmed by the study of **(King et al. 2018**) who examined the impact of fall prevention strategies on nurses and the care of fall-risk patients. The researchers found that implementing structured fall prevention protocols led to improved patient outcomes, including a reduction in fall-related injuries and hospital length of stay.

These findings align with study's results of **(Ali Mohamed Ismail, & Zayed Mohamed Ismail, 2020)** who concluded that the implementation of nursing strategies resulted in a significant decrease in fall-related injuries and a reduction in hospital length of stay among the study group.

Related to relation between study and control group demographic data and risk of falling assessed by Morse fall scale after implementing nursing strategies, the current study findings showed none statistical significant relation between risk of fall post implementing nursing strategies with study and control groups' gender and occupation, while a statistical significant relation was found between study and control groups' age, education and risk of fall post implementing nursing strategies

The findings suggest that gender and occupation do not significantly influence fall risk following the implementation of nursing strategies, likely because these factors do not directly impact physiological and cognitive conditions associated with falls. However, the significant relationship between age, education level, and fall risk highlights the role of age-related physical and cognitive decline in increasing fall susceptibility. Older patients are more likely to experience muscle weakness, balance impairment, and multi-morbidity, which heighten their risk of falling despite preventive measures.

Additionally, educational level may influence patients' understanding and adherence to fall prevention strategies, as individuals with higher education might be more receptive to health instructions and safety measures. This aligns with existing literature emphasizing age as a primary risk factor for falls and the potential role of patient awareness in mitigating fall-related incidents.

The current study finding was compatible with the study conducted by **(Reuben et al. 2017)** whose study found no significant relationship between post-implementation fall risk and gender or occupation in study and control groups. However, a significant relationship was observed between age,

education, and fall risk after implementing nursing strategies. This result was confirmed by the study of ***(Dykes et al. 2021)*** *that* highlighted that while factors such as gender and occupation may not significantly impact fall risk, age and education level are critical considerations. Older patients often face increased fall risk due to age-related physical and cognitive changes, and a higher education level can enhance a patient's understanding and adherence to fall prevention measures.

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