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Effectiveness of fall prevention program on nurses' knowledge and fall prevention practices

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Abstract

Introduction: Falls are one of the most common accidents associated with physical and psychological injury and economic harm. Nurses who care for patients should be aware of the risk factors of patient falls, ways to prevent falls and provide nursing intervention. Hence, a fall prevention program was organized in order to educate the nurses regarding fall prevention. **Objective:** The objectives of the study were to identify the nurses' knowledge and fall prevention practices in the hospital before and after implementation of educational sessions, to evaluate the effectiveness of fall prevention programs on nurses' knowledge and fall prevention practices and to find out the association between post-intervention nurses' knowledge with selected demographic variables. **Method:** Pre-experimental research design was used. A purposive sampling technique was used to select 60 registered nurses working at National Heart Institute, Delhi. **Results:** The study findings showed that the majority of staff nurses (61.7%) had average knowledge about fall prevention in the pre-test. Post-test results showed 100% improvement with staff nurses having good knowledge as compared to 26.7% in the pre-test, indicating improvement in knowledge with the program whereas, the post-intervention scores showed that 100% of the departments followed a good level of practice as compared to the scores of pre-interventions. There was a significant difference between pre-test and post-test knowledge scores of the staff nurses regarding fall prevention ($t = 15.837, p = .001$) and pre- and post-intervention scores ($t = 8.050, p = .001$) regarding fall prevention practices. No association was found between post-test knowledge scores regarding fall prevention and demographic variables. **Conclusion:** From the findings, it can be concluded that the fall prevention program was effective in improving nurses' knowledge and fall prevention practices.

Keywords: falls, fall prevention practices, fall prevention program, nurses' knowledge, staff nurse

Introduction

Ensuring the safety of patients is the primary outlook of the healthcare industry. Patient safety refers to the prevention of direct or indirect harm, as well as injury to the patient. All healthcare personnel are equally responsible for ensuring the safety of their patients (Joshi & Solankhi, 2019). According to the World Health Organization (WHO), "*patient safety is the absence of preventable harm to a patient during the healthcare cycle and the*

reduction to an appropriate minimum of the risk of unintended harm associated with healthcare". Patient Safety is a speciality in healthcare that arose with the growing complexities in healthcare systems and the subsequent rise of patient harm in healthcare establishments (WHO, 2019).

Patient safety is an important issue in hospitals, and the incidence of patient falls is a distinct indicator of quality healthcare (Huang et al., 2015). Adverse incidents due to inadequate treatment are potentially among the top ten causes of death and disability in the world (WHO, 2019). Every year, millions of patients suffer injuries or succumb to death due to unsafe and low-quality healthcare. Many medical practices and risks associated with healthcare are posing major challenges for patient safety and contributing significantly to the dilapidating standards of healthcare (WHO, 2019). Patient falls are thus one of the major concerns under the ambit of patient safety.

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The WHO defines fall as “an event which results in a person coming to rest inadvertently on the ground or floor or other lower level” (WHO, 2021) whereas, the National Database of Nursing Quality Indicators defines a fall as “an unplanned descent to the floor with or without injury” (AHRQ, 2013; NDNQI, 2020). Patient falls are defined as the rate at which patients fall during their hospital stays per 1000 patient days, and are a nursing-sensitive quality indicator in the delivery of in-patient services (El-Enein, El-Ghany, & Zaghloul, 2012). Falling is characterized as a sudden drop to the floor or other flat surfaces (Huang *et al.*, 2015).

The increased number of falls in the healthcare sector must be tackled through alleviating measures to reduce the rate of patient falls. As a result, fall prevention programs have been introduced. The interdisciplinary falls prevention program is intended to provide the hospitalized patients with a healthy atmosphere, not only in the incidence of falls but also in the related injuries. It was developed using data from an earlier nurse-led approach and results in the literature on fall prevention (Schwendimann, Bühler, Geest, & Milisen, 2006). Over the years, hospitals have implemented many strategies, and procedures aimed at minimizing the risk of fall prevention programs are often used. Risk assessment techniques are used to help reduce falls. Fall prevention programs may work to educate both nurses and patients on the factors causing falls and the injuries resulting from falls (El-Enein, El-Ghany, & Zaghloul, 2012).

Objectives

The objectives of the study were:

- To identify the nurses’ knowledge and practice on the prevention of patient falls in the hospital before and after implementation of educational sessions.
- To evaluate the effectiveness of fall prevention programs on nurses’ knowledge and fall prevention practices.
- To find the association between post-intervention nurses’ knowledge with selected demographic variables.

Materials and Methods

A quantitative evaluative approach and pre-experimental research design with a one-group pre-test and post-test

were utilized in this study. A non-probability purposive sampling technique was utilized to get the samples. The sample consisted of 60 registered nurses working at National Heart Institute (NHI), Delhi. The nurses who have completed GNM or BSc Nursing, registered as Registered Nurse (RN) and Registered Midwife (RM), available at the time of data collection, and those working in the wards and intensive care units of NHI, Delhi were included in the study.

Tools for data collection

Tool 1- Knowledge questionnaire. A structured knowledge questionnaire was developed to assess the knowledge of the fall prevention program. The items in the questionnaire were developed as per the blueprint. The content area included were assessment and patient safety management, risk factors and causes of fall, fall prevention, fall risk assessment, universal fall precautions, nursing considerations, and fall prevention program. The tool had a total of 20 items with multiple questions and the total score was 20.

Tool 2- Nursing audit checklist. A nursing audit checklist was used to measure fall prevention practices. It consisted of 30 items that measured whether the fall prevention practices are being followed or not in the concerned area. Each practice being followed carried one mark whereas, if it is not followed zero marks were given.

Reliability of tool

The reliability of the tool was determined by varied methods to find out the reliability coefficient of the tools. In order to establish reliability, the tool was administered to seven staff nurses working at a medical-surgical ward. To check the reliability of the knowledge questionnaire, the split-half method was used and the reliability coefficient was found to be 0.879. The reliability of the nursing audit practice checklist was determined by the inter-rater reliability method and the reliability coefficient was found to be 0.843. Hence, both tools were considered reliable.

Data collection

Prior to the data collection, following ethical considerations were taken:

- Permission letter for conducting a research study and waiver consent from the Principal, National Heart Institute College of Nursing.
- Permission from the ethics committee of All Indian Heart Institute Foundation (IEC Number 3/9/105/EC/2019).

Data were collected from 25 December 2019 to 1 March 2020. On day one, a pre-test was conducted by using knowledge and practice tools on fall prevention from the registered staff nurses followed by an educational session on fall prevention. The educational session was implemented with the help of a PowerPoint presentation and the staff nurses were introduced about posters to be pasted for awareness on the risk of fall, pink name card and blue identification band for vulnerable patients, do's and don'ts in case of fall etc. Total time taken for data collection was 68 days. Interventions other than educational sessions took approximately one hour which included pasting of the posters regarding fall risk awareness at the bedside and in washrooms, pink coloured door slips for vulnerable patients, blue identification band for vulnerable patients, and providing brochures to the patients on admission. After a period of seven days, a post-test was conducted on the same registered nurses using the same closed-ended questionnaire followed by a post-interventional audit using the same supervisory checklist. All the activities were carried out equally for all the registered nurses in the same ward.

Results

Section 1: Description of demographic data of staff nurses

Table 1 depicts that the majority (63.3%) of staff nurses were in the age group of below 25 years whereas most of the staff nurses were female. The highest percentage (43.3%) of staff nurses had 1-3 years of experience.

Section 2: Effectiveness of fall prevention program on nurse's knowledge and fall prevention practices

Data presented in Table 2 depicts the knowledge scores measured during pre-test, which showed that majority of staff nurses (61.7%) had average knowledge about fall prevention. In the post-test, it showed a huge improvement with 100% of staff nurses having good knowledge as compared to 26.7% in pre-test. These findings indicate the improvement in knowledge with the program.

Table 1

Frequency and Percentage Distribution of Sample Characteristics

N = 60		
Demographic Variables	Frequency (f)	Percentage (%)
Age (in years)		
Below 25	38	63.3
26-30	19	31.7
31-35	03	5.0
Gender		
Male	03	5.0
Female	57	95.0
Professional qualification		
Diploma in nursing and midwifery	38	63.3
BSc (Nursing)	19	31.7
Post Basic BSc (Nursing)	03	5.0
6 years and above	04	6.7
Years of experience		
<1 year	19	31.7
1-3 year	26	43.3
3-6 years	11	18.3
6 years and above	04	6.7
Service education Program		
Attended	00	00
Not attended	60	100
Department		
Ward	26	43.3
ICU	34	56.6

Table 2

Frequency and Percentage Distribution of Pre-test and Post-test Knowledge Score of Staff Nurses

N = 60							
Level of knowledge	Maximum possible score	Scoring (from 0-20)		Pre-test		Post-test	
		Range of scores	%	f	%	f	%
Poor		0-7	0-35%	07	11.7	00	00
Average	20	8-13	36-68%	37	61.7	00	00
Good		14-20	69-100%	16	26.7	60	100

Note. f = Frequency; % = Percentage; Scoring = the knowledge assessment questionnaires included 20 questions regarding fall prevention. Each correct answer gives 1 score. Scoring was done by dividing the total score into 3 halves thereby highest score had good knowledge and the lowest score in the range had poor knowledge.

Table 3

Area wise Mean, Standard Deviation, Mean Percentage of the Pre- and Post-test Knowledge Scores regarding Fall Prevention among Staff Nurses

N = 60

Knowledge components	Max score	Pre-test			Post-test			Difference in mean %
		Mean	SD	Mean %	Mean	SD	Mean %	
Assessment and patient safety management	4	2.0	1.008	50	3.35	0.755	83.75	33.75%
Risk factors and causes of fall	4	3.10	1.003	77.50	3.90	0.302	97.50	20%
Fall prevention	4	2.20	1.147	55	3.383	0.666	84.57	29.57%
Risk of fall assessment	1	0.517	0.504	51.70	0.917	0.279	91.70	40%
Universal fall precautions	2	0.883	0.454	44.15	1.333	0.509	66.65	22.50%
Nursing considerations	3	1.917	0.787	63.90	2.383	0.661	79.43	15.53%
Fall prevention program	2	1.217	0.64	60.85	1.883	0.324	94.15	33.3
Overall Scores	20	11.833	2.947	59.15	17.15	1.299	85.75	26.6%

Note. SD = Standard deviation.

Table 3 indicates the area wise distribution of the mean, standard deviation (SD) and mean percentage of pre-test and post-test knowledge scores among seven components. The highest mean score in the pre-test ($M = 3.10$, $SD = 1.003$) was in the area of 'Risk factors and causes of fall' which is 77.50% of the total score whereas, the lowest mean score ($M = 0.517$, $SD = 0.504$) revealed mean percentage of 51.70% was for the area 'risk of fall assessment'. In the post-test, the highest mean score ($M = 3.90$, $SD = 0.302$) was in the area of 'Risk factors and causes of fall' which is 97.5% of the total score and the lowest post-test mean score ($M = 1.333$, $SD = 0.509$) revealed mean percentage of 66.65% for the area of 'universal fall precautions'. Further, the overall pre-test mean score was ($M = 11.833$, $SD = 2.947$) which is 59.15% whereas, in the post-test, the mean score was ($M = 17.15$, $SD = 1.299$) which is 85.75% of the total mean score depicting the overall mean difference in mean percentage of 26.6%. It reveals that the staff nurses under the study had good knowledge on 'fall prevention' after the implementation of an educational session on fall prevention.

Table 4

Comparison of Pre- and Post-test Knowledge on Fall Prevention among Staff Nurses using Paired 't' Test

N = 60

Comparison	Mean	SD	MD	Calculated 't' value	Table 't' value	p value
Post-test	17.15	1.299	5.316	15.837	1.294	.001*

Note. SD = Standard deviation; MD = Mean Difference; Level of significance $p < .05$; * Significant; $df = 59$.

The data presented in Table 4 shows that the mean post-test knowledge score was higher than the mean pre-test knowledge score. A statistically significant difference was evident between mean pre-test and post-test knowledge scores ($t(59) = 15.837$, $p < .05$). Thus, it is established that the difference obtained in pre-test and post-test knowledge scores was the true difference and not by chance.

Section 3: Effectiveness of fall prevention program on audit score regarding fall prevention practices

The audit checklist included 30 parameters regarding fall prevention practices to identify the level of practice being followed. For each practice being followed, a score of 1 was given. Scoring was done by dividing the total score into 3 equal halves. The level of fall prevention practice was divided into good, average, and poor.

Table 5
Frequency and Percentage of Pre- and Post-Intervention Audit Score of Various Departments of NHI on Fall Prevention Practices on the Basis of Level of Practice

Level of practices	Maximum possible score	Scoring	N = 9				
			Pre-intervention		Post-intervention		
			f	%	f	%	
Poor	0-10	0-35%	00	00	00	00	
Average	30	11-20	36-68%	06	66.6	00	00
Good		21-30	69-100%	03	33.3	9	100

Note. f = Frequency; % = Percentage.

Table 5 indicates the audit scores. Audit scores measured before the intervention represent that the majority of departments (66.66%) followed an average level of fall prevention practice compared to ICUs. In the post-intervention, it showed a huge improvement with 100% of departments following a good level of practice as compared to 33.33% in pre-intervention. These findings indicate that there is an improvement in fall prevention practices with the program.

Table 6
Comparison of Pre- and Post-Intervention Audit Score regarding Fall Prevention Practices using Paired 't' Test

Comparison	Mean	SD	MD	Calculated 't' value	Table 't' value	p value
Pre-test	18.222	3.032				
Post-test	27.222	0.441	9.0	8.050	1.397	.001*

Note. SD = Standard deviation; MD = Mean Difference; Level of significance $p < .05$; * Significant; $df = 8$.

The data presented in Table 6 shows that the mean post-test score ($M = 27.222, SD = 0.441$) assessed via nursing audit was higher than the mean pre-test score ($M = 18.222, SD = 3.032$) with the mean difference of 9.0. A statistically significant difference was evident between mean pre-test and post-test practice scores ($t(8) = 8.050, p < .05$). Thus, it is established that the difference obtained in mean pre-test and post-test scores regarding fall prevention practices assessed via nursing audit was a true difference and not by chance.

Table 7
Association Between Post-Test Knowledge Scores on Fall Prevention with Selected Demographic Variables

Demographic variables	N	Median=17		χ^2	df	Table value	p value
		Below Median (17)	Above Median (43)				
N = 60							
Age (in years)							
Below 25	38	11	27				
26-30	19	5	14	0.0821	2	5.991	.959
31-35	03	1	2				
Gender							
Male	03	2	1				
Female	57	15	42	2.285	1	3.841	.131
Professional qualification							
Diploma in Nursing and Midwifery	38	12	26				
BSc (Nursing)	19	5	14	1.421	2	5.991	.491
Post Basic (Nursing)	03	0	3				
Years of experience							
<1 year	19	6	13				
1-3 year	26	7	19				
3-6 years	11	2	9	1.607	3	7.815	.658
6 years and above	04	2	2				
Department							
Ward	26	7	19				
Intensive care unit	34	10	24	0.045	1	3.841	.832

Note. χ^2 = Chi-square; df = Degree of freedom; Level of significance $p < .05$.

Section 4: Association between knowledge scores of nurses and selected demographic variables

To find the association between the post-test knowledge scores of the staff nurses regarding fall prevention with their demographic variables, chi-square test was computed. The data from Table 7 reveals that there is

no significant association between post-test knowledge scores when compared to age, gender, professional qualification, years of experience, department, and in-service education. Hence, it can be interpreted that the difference in the level of knowledge related to age, gender, professional education, and department working and years of experience were not true differences and only by chance.

Discussion

This study evaluated the effectiveness of a fall prevention program on nurses' knowledge and fall prevention practices. The result of this study indicates that there is an improvement in the nurses' knowledge assessed via knowledge questionnaire and fall prevention practices assessed via supervisory nursing audit regarding fall prevention, hence indicating the effectiveness of the fall prevention program.

The findings of the present study revealed that the staff nurses under the study had an average knowledge before the educational session on fall prevention. This finding is consistent with the previous study by Joshi and Solankhi (2019) who reported more or less similar findings in his study that the average test score of nurses was 3.18 out of 10 before the training. Yet another similar study by Nwaise (2017) who assessed 30 nurses for their knowledge on fall prevention strategies, hospital policy and criteria for monitoring patients using care view video monitor also reported an average score of 43% in pre-test with a range of pre-test score from 0-71% hence, supporting the present study.

The findings of the present study reported a significant improvement in the knowledge and fall prevention practices after the implementation of the fall prevention program. The results of this study are consistent with those of other studies on fall prevention in which knowledge was increased after the implementation of the program (Huang *et al.*, 2015). The findings of the study are supported by another study conducted by Maneeprom *et al.*, (2019) which illustrated significant improvement in the mean knowledge score (25.8 ± 4.5 , $p < .05$).

The present study revealed no significant association between knowledge scores of staff nurses regarding

fall prevention in post-test when compared with age, gender, professional qualifications, years of experience, departments working and in-service education regarding fall prevention. The result is consistent with another study conducted by Kim and Seo (2017) which published the relationships between knowledge, attitudes, and fall prevention activities indicating that the knowledge about falls had no correlation with attitude or prevention activities, but a correlation was found between attitude and fall prevention activities. Ganabathi *et al.*, (2017) showed contradictory findings and addressed the statistically significant association between nurses' knowledge and nationality, work experience; association between attitude and age, undergraduate training; association between practice and age, educational background ($p < .05$).

Conclusion

The result of the study shows staff nurses having good knowledge after the implementation of the educational sessions compared to the average knowledge prior to the implementation of educational sessions, hence revealing the effectiveness of educational sessions in increasing the knowledge of staff nurses on fall prevention. A highly significant difference was found between the pre-test and post-test knowledge and audit scores on fall prevention but no significant association was found between the post-test knowledge scores when compared with the demographic variables of staff nurses. Hence, we conclude that the fall prevention program was effective in improving the knowledge of nurses as well as fall prevention practices.

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