International Journal of Multiphysics
Volume 18, No. 3, 2024
ISSN: 1750-9548

Factors Affecting Nurses Performance Regarding Safety Measures for Patients Post Cardiac Catheterization

Shimaa Mohamed Rafaat [(1)], Nadia Mohamed Taha[(2)], Maha Desoky Sakr [(3)] , Mona Abdullah Mohamed Ali[(4)]

(1) B.Sc. Nursing, Faculty of Nursing, Zagazig University
(2) Professor of Medical Surgical Nursing, Faculty of Nursing, Zagazig University
(3) Assistant Professor of Medical Surgical Nursing, Faculty of Nursing, Zagazig University
(4) Assistant Professor of Medical Surgical Nursing, Faculty of Nursing, Zagazig University

Corresponding Author: Shimaa Mohamed Rafaat

Abstract:

Background: Cardiac catheterization is perhaps one of the most diagnostic and interventional tools available to the cardiologist today which does a comprehensive examination of how the heart and its blood vessels function.

The study aimed to evaluate factors affecting nurses performance regarding safety measures for patients post cardiac catheterization.

Design: A descriptive design was utilized**.**

Setting: Data was collected from cardiac care units at Zagazig University hospitals.

Tool of data collection: Two tools were used for data collection, First: Self-Administered questionnaire to collect personal characteristics of study nurses and questions to assess nurses knowledge regarding CC and factors affecting nurses performance regarding safety measures. Second tool was an observational Checklists to assess nurses practice regarding safety measures for patients post cardiac catheterization.

Study subject: The study was conducted on 50 nurses who worked in above mentioned setting.

Results: The current study revealed that 66.0% and 84% of the studied nurses had unsatisfactory overall knowledge and incompetent level of total practices regarding safety measures for patients post CC. Also, 74.0% of the studied nurses had positive effect by the total factors related to patient safety after CC. **conclusion**, two thirds of the studied nurses had unsatisfactory level of knowledge regarding safety measures for patients post CC, the majority of the studied nurses had incompetent level of practices regarding safety measures for patients post CC and less than three quarters of the studied nurses had factors affecting their performance. In addition, there is a statistically significant positive correlation between knowledge score and practice score. Also, statistically significant positive correlation between practice score and factors affecting nurses performance.

Recommendation Standard nursing procedures booklets should be available in cardiac catheterization units

Keywords: Cardiac Catheterization, Factors, Nurses Performance, Safety Measures

Introduction

Coronary Artery Disease (CAD) has been remaining the first killer and the major cause of public health problems in the world, which is one of the most common causes of morbidity and mortality in different

communities. Moreover, CAD is the main cause of death in the United States of America among human adults representing approximately one-third of all deaths, who are over the age of 35years ***(Thabet et al,2019)*** CC is considered the effective diagnosing, evaluating, and treating method of cardiac diseases problems. CC is performed to measures blood pressure, blood flow to the heart, the level of oxygen in the blood, blood samples and a biopsy of heart muscle during the procedure.***(Khaliel et al,2022)***

Cardiac catheterization is an invasive technique which may lead to several major and minor complications which may contribute to morbidity and mortality. Early diagnosis of problems and appropriate treatment are logically related to taking action to receive timely care, hence reducing further complications***.(Mohamed etal,2023)***

Patient safety in minimizing complications is increasingly recognized as essential in practice of coronary care unit. Individual have right to have safe and effective quality health care and is defined as being free from accidental harm as a result of a health care encounter removing femoral sheaths and managing related complications after procedure, such as promoting hemostasis as an essential issue are predominantly the responsibilities of nurses in many acute and critical care settings. ***(Rajesh, 2018)***

Nursing practice post the procedure included observing vital signs, the catheter insertion site, and evaluating peripheral circulation in the affected extremity frequently (as peripheral skin color, temperature, the presence of peripheral pulses, and capillary refill, observing and managing chest pain episodes. Also maintaining adequate periods of rest with the affected extremity straight, administering required drugs, observing the patient's fluid intake and output and reporting any abnormal findings to the physician.***(Hamed et al,2023)***

Several variables that are important to study are individual variables (age, education, length of work, education and training/training), psychological variables (motivation), and organizational variables (incentives, work environment, supervision). The performance of nurses in hospitals is closely related to reliable, skilled, and professional human resources. Therefore, the reliability, skills, and work professionalism of a nurse will be able to create a better hospital performance climate supported by the hospital management itself and the managerial elements that surround i. ***(Marquis & Huston, 2019)***

Significance of the study

Heart diseases are responsible for 50% of cardiovascular death bed globally. 12.8% of all-cause of death and 29.4% in Egypt. 17% of emergency units is chest pain complain. 8-10% of them need catheterization. The need for cardiac catheterization has been increased. It is a less invasive safe procedure with a high profit. It is reducing hospital stay, wait time, and list for diagnosis and treatment ***(Hassan, et al., 2021).*** About 3600 patients with cardiac catheterizations are scheduled in 2020 at El Zagazig university hospital for catheterization, from this point cardiac catheterization is an extremely valuable procedure in diagnosis and treatment of cardiac diseases ***(Saad, et al., 2024***)

Improving nursing knowledge and practice regarding safety measures is very essential that can achieve through clear identification of deficiencies in provision of care and increasing nurses' awareness regarding their vital role in saving patient life through safe practice. ***(Khaliel, et al., 2022).*** Nurses who are able to promptly identify complications are in the optimal position to prompt critical action. Thus, nurses that are competent in the care of patient during CC are able to minimize mortality and morbidity rates ***(Coomes et al., 2020).*** So, the current study will be carried out to evaluate factors affecting nurses performance regarding safety measures for patients post cardiac catheterization.

Aim of the study:

To evaluate factors affecting nurses performance regarding safety measures for patients post cardiac catheterization.

Research questions

- What is the level of nurses' knowledge regarding safety measures for patients post cardiac catheterization?
- What is the level of nurses' practices regarding safety measures for patients post cardiac catheterization?
- What are factors affecting nurses' performance regarding safety measures for patients post cardiac catheterization?

Subjects and Methods

Study Design

A descriptive design was utilized to accomplish the aim of this study

Setting

The study was carried out in two cardiac care units at Zagazig university hospitals, one is located in the third floor of cardiac and thoracic hospital, Sednawy Hospital and other in fourth floor in the same building.

Subjects

The study involved convenient sample of available nurses (50) working at El Zagazig Hospitals cardiac catheterization unites

Tools of data collection:

Data of this study was collected by the researcher using two tools as the following

Tool I: Self-Administered Questionnaire for Nurses (Appendix I)

It was designed in simple clear Arabic language to avoid misunderstanding. It was designed by the researcher after reviewing of related literature references and opinions of experts for content of validity. It composed of three parts as the following:

Part I: Nurses' Demographic Characteristics: involved personal data related to nurses contained 7 questions included age, sex , marital status**,** qualifications, years of experience , attendance of previous training courses related to safety measures in the cardiac catheterization unit and monthly income.

Part II: Nurses' Knowledge Assessment Questionnaire: this part was utilized to assess nurses knowledge regarding safety measures for patients post cardiac catheterization. This is composed of 22 questioning of MCQ format and arranged into two main sections

Section A: it included 8 questions about (definition, types, indications, insertion site, purpose, duration of procedure, all indications of CC with exception of and type of used anesthesia) ***(Saad et al.,2024) (Khaliel et al.,2022***

Section B: it composed of 14 about (nursing care priorities for a patient after CC, monitoring patient after CC, measuring vital signs after CC ,basic nursing care to prevent complications after CC, most important general complications that may occur, symptoms that reported immediately after procedure, nursing instructions after CC, nursing intervention to prevent patient bleeding after CC, the care that patient need after CC, when the wound dressing should be changed, avoidance moving the affected limb for at least, when is the sheath removed after CC, when the patient allowed to eat after CC and duration of pressure at insertion site after sheath removal**.** ***(Mohamed, et al.,2023) (Khaliel et al.,2022)*.**

Scoring system: The sheet used a 2-point scale that ranges from one "correct answer", zero "incorrect answer". The total score is 22 grades. These scores were summed and converted into a percent score. It was classified into 2 categories: satisfactory if score ≥ 90% and unsatisfactory if score less than 90% based on statistical analysis.

Part III: Factors Affecting Nurses Performance Regarding Safety Measures Post CC concerned with factors affecting nurses performance regarding safety measures for patients post cardiac catheterization which adapted

from ***(Ahmed et al.,2018) (Abd Elawhabe et al.,2019) (Abd rabo et al.,2024)*** and modified by the researcher to suit the aim of the study. It was translated into Arabic language and it included 49 point divided into 5 items:

1- Factors related to nurse:

It is composed of 13 items that is related to role of nurse regarding safety measures of patient post cardiac catheterization

2- Factors related to professional support

It is composed of 5 items that covered presence of training courses, availability of nursing skills booklet, availability of necessary medications for rescuing patients, clear and specific guidelines on how to handle CC patients and using of modern technological means within CCU.

3- Factors related to job satisfaction

It is composed of 10 items that covered satisfaction regarding work, regarding caring of patients, having motivation to perform your role, your role is important, the salary is appropriate, incentive rewards from the administration, the daily working hours suitable, the work climate suitable to provide suggestions, comfortable with providing care to patients and difficulty for speaking if there is a problem

4- Factors related to safety measures

It is composed of 7 items that covered handling of medical errors, clear entities for addressing questions, updated records of any nursing care, system for exchanging all information, nurse responsible for each patient, presence of healthcare plan and presence of written protocols regarding the safety

5- Factors related to work environment

It is composed of 14 items: Relation between health care team includes seven items and Factors related to work environment includes seven items

The scoring system for factor items

The responds to these statements were on two scales as follows: positive =one and negative = zero. Total score for whole factors assessment tool was calculated for every nurse and the mean of total score was calculated. The nurses performance was affected with this factor when the total score equal or above 75% and not affected when the total score below 75% based on statistical analysis

Tool II: Nurses' safety Measures observational checklist(Appendix II)

It was used to assess level of nurses' practices regarding safety measures for patients post CC. Attenuated observational checklist was adapted by the researcher guided by **(Mohamed *et al.*,2023*) (Khaliel et al.,2022)*.**It consists of 6 parts:

Hand washing: which include (19 items)

Wear the protective clothes: (8 items)

Check dressing and site of injection: (4 items)

Sign-out instructions after cardiac catheterization: (15 items)

Drug Administration safety measures: (29 items)

Fluid Intake and Output Guidelines: (10 item)

The Scoring system regarding practice:

For observational checklist consisted of given score one for done step and score zero for the not done, the scores of the items were summed-up and the total divided by the number of the items, giving a mean score for the part. The nurses had a competent level of practice when the total score equal or above 90% and incompetent if it below 90% based on statistical analysis.

Content validity and reliability

Content validity was carried out to ensure that the tools content adequately cover the study aim. It was be used to modify the tools. It was ascertained by a committee involving five expertise from Nursing Faculty at Zagazig University (two of them professors and three assistant professors of nursing), who reviewed the tool for clearance, relevancy, coverage, simplicity and applicability. All suggested changes were implemented. Cronbach's Alpha has been employed to measure the entire consistency (reliability) concerning the tools, 0.783 for nurses' knowledge, and observational checklist (practice) was reliable at 0.768. While factors that affect nursing performance was 0.812

Field work

Data collection was carried out over a period of six months from, January 2025 to June 2025. Each nurse was met individually, got a full explanation about the aim of the study and was invited to participate. The nurse who gave his/her verbal informed consent to participate was handed the self-administered questionnaire and was instructed during the filling.

The data were collected two days a week (Saturday and Wednesday) in the morning and afternoon shifts, the time used for finishing the self- administered questionnaire ranged between 30-45 minutes for each nurse according to nurses' physical and mental readiness and for nurses practice, also the researcher was observing nurses' practical skills about studied procedures. The time needed to complete the checklist varies ranged between 1- 2 hours.

Pilot study

Five nurses (10%) of the entire study population participated in a pilot study to see whether the tools are time-consuming, practicable, applicable, clear, and intelligible. Based on the findings of the pilot research, the necessary adjustments were made. Later, pilot participants were not included in the primary study population.

Administrative and ethical considerations:

First, the study proposal was accepted by the Zagazig University Faculty of Nursing's Post Graduate Committee and Research Ethics Committee (REC) with the code of M.D.ZU.NUR/234/9/7/2024.the general director of Zagazig University Hospitals received the required approvals, which were acquired from the dean of the Faculty of Nursing.

After outlining the goal of the study, the head of the aforementioned setting granted permission to conduct it. During the first interview, each prospective participant was briefed about the nature, goals, and advantages of the study, as well as the fact that participation is entirely voluntary. By coding all of the data, the subjects' confidentiality and anonymity were likewise guaranteed.

The researcher assured that the data collected, and information would be confidential and would be used only to improve their health and for the purpose of the study and there was no risk for study subject during application of the research.

Additionally, each participant gave their informed consent after being fully informed of the study's purpose and methods, and before they were included in the study. They were made aware of their freedom to decline or leave the study at any moment, without explanation or repercussions.

Statistical analysis

All data were collected, tabulated and statistically analyzed using Statistical Package for Social Science (SPSS) version 25.0 for windows. Quantitative data were expressed as the mean ± SD & (range), and qualitative data were expressed as absolute frequencies (number) & relative frequencies (percentage). Percent of categorical variables were compared using Chi square test ($\chi 2$) or Fisher's exact test when appropriate. Pearson's rank correlation coefficient was calculated to assess relationship between various study variables, (+) sign indicate direct correlation & (-) sign indicate inverse correlation, also values near to 1 indicate strong correlation & values near 0 indicate weak correlation. All tests were two sided. P-value < 0.05 was considered statistically significant

(S), and p-value ≥ 0.05 was considered statistically insignificant (NS) while P-value < 0.01 indicates highly Significant (HS)

Results:

Table (1) demonstrates that about half (48.0 %) of the studied nurses within 20 -29 age range with mean ±± SD 33.34±9.79, and (82%) of nurses were females. while (86.0%) of studied nurses were married. Regarding educational level more than third (38.0%) of the studied nurses graduated from technical nursing institute, about three fifths (58.0%) of the studied nurses didn't have any training courses and had insufficient income. Concerning experience, more than two fifths (42.0 %) of the studied nurses had less than 5 years of experience with mean± SD 6.62±4.04 respectively

Figure (1) illustrates that, (66.0%) of studied nurses had unsatisfactory knowledge regarding cardiac catheterization, while (34.0%) of them had satisfactory level of knowledge

Table (2) illustrates that (86.0%) of the studied nurses had positive effect by nursing related factors and (54.0%) of them had positive effect by professional support related factor, while (60.0 %) had negative effect by the job satisfaction related factor. But, (66.0 %and 74%) of the studied nurses had positive effect by safety measures related factor and work environment related factor. Lastly, (74.0%) of the studied nurses had positive effect by the total factors

Figure (2) illustrates that, (84%) of the studied nurses had incompetent level of total practices regarding safety measures for patients post cardiac catheterization, while nearly (16%) of them had competent level

Table (3) illustrates that, there was a statistically significant relation between total factors affecting nursing performance and demographic characteristics of the studied nurses related to years of experience with P value = (0.013).

Table (4) shows that, there was a highly statistically significant positive correlation between the total knowledge and total factors affecting performance with r = 0.545 and P < 0.001, and also, there was a positive correlation between the total knowledge and total practice with r = .331and P = 0.019 and between the total factors affecting performance and total practice with r = .430 P = 0.002

Discussion:

According to the current study, less than half of the nurses under study met certain demographic characteristics within 20 -29 age range with mean ±± SD 33.34±9.79. The current study's findings contrast with those of **(Elgazzar & Keshk,2018)** who found in study about " Effect of a construction educational protocol on nurses' knowledge, performance and its effect on patient satisfaction undergoing cardiac catheterization " shown that the majority of nurses were between the ages of 30 and 40.

According to the present analysis, majority of the studied nurses were female. the result was comparable to **(Henedy & El-Sayad,2019)** who mentioned that the majority of the studied nurses were female in his study titled " Nurses' Knowledge and practice regarding patient's safety Post Cardiac Catheterization". In my opinion this outcome might be attributed to the reality that a larger proportion of nursing in Egypt are women, and nursing at Egyptian universities were exclusively for females until a few years ago.

The current analysis found that more than one third of the studied nurses had technical nursing institute. This finding on contrary with **(Saad et al.,2024)** who claimed that three-quarters of nurses in the study had nursing diploma

Regarding experience years, this study indicated that more than one third of the studied nurses had less than 5 years of experience. This finding is in harmony with **(Khaliel et al.,2022)** who revealed that about less than two third of studied nurses had experience less than five years

Concerning training courses related to cardiac catheterization, more than half of the studied nurses lacked any training programs. the findings were almost matching with those expressed by **(Jabr et al.,2022)** who found in

thesis entitled Nurses' Knowledge and Practice Regarding Care for Patients Undergoing Cardiac Catheterization" that less than two thirds of the studied nurses didn't have any training courses about cardiac catheterization.

The present study clarified that the studied nurses had unsatisfactory level of knowledge regarding care of cardiac catheterization of the nurses. This unsatisfactory level of knowledge may be due to most of studied nurses had technical institute, lack of training program and nearly, there is no protocol or guidelines about CC management. In the same line with **(Jabr et al.,2022)** who reported in thesis entitled " Nurses' Knowledge and Practice Regarding Care for Patients Undergoing Cardiac Catheterization" that more than three quarter of the studied nurses had un satisfactory total level of knowledge regarding cardiac catheterization.

The current study revealed that less than three quarters of the studied nurses their performance was affected by nurse, professional support, job satisfaction, safety measures and work environment related factors. This result in the same line with ***Abd Elawhabe et al.,(2019)*** who reported in thesis entitled "Factors Affecting of Nurses Performance for Patients undergoing Cardiac Catheterization" that many factors affecting on nurses performance mainly nursing related factors, Communication within the work environment, Regulation inside the work, Availability of professional support of care of patients, Extent of job satisfaction.

Also, in accordance with ***Gouda et al.,(2019)*** who presented in a study entitled" Factors Affecting Postoperative Nursing Performance in The Surgical Units" that more than two thirds of the studied nurses their performance was affected by environmental factors, organizational factors, psychological factors, personal factors and patient related factors.

This research found that most of the nurses who were studied had incompetent level of total practices regarding safety measures for patients post cardiac catheterization. From the point of researcher's view, the unsatisfactory practice may be due to lack of knowledge, training, qualification, motivation, years of experience, insufficient equipment, improper environment and workload and nearly, there is no protocol, guidelines, nursing care standard or close observation .This result was consistent with ***(Saad et al.,2024)*** who disclosed that more than half of the studied nurses had inadequate practice regarding care of cardiac catheterization.

Based on the results of the current study, there was a statistically significant relation between total factors affecting nursing performance and demographic characteristics of the studied nurses related to years of experience. This results agree with **(Atta et al.,2019***)* who found in the study" Nursing Staff' Perception Regarding Factors Influencing Their Performance in General Hospital "that there was a statistically significant relation between nurses' age, years of experience and qualifications with factors affecting nurses' performance

The present study revealed that, there was a highly statistically significant positive correlation between the total knowledge and total factors affecting performance and also, there was a positive correlation between the total knowledge and total practice and between the total factors affecting performance and total practice These findings were in agreement with ***(*Moghazy et al,2024*)*** who clarified in a study " Factors Affecting Nurses' Performance Regarding Prevention of Central Venous Line Associated Infection" that there was a statistically significant correlation between nurses' knowledge regarding prevention of CVLAI and practices as well as factors affecting their performance, and vice versa

Conclusion:

According to the results and discussion of the present study, it concluded that, two thirds of the nurses who were studied had unsatisfactory level of knowledge regarding safety measures for patients after cardiac catheterization, the majority of the studied nurses had incompetent level of practices regarding safety measures for patients post cardiac catheterization and the overall level of knowledge of the nurses was positively correlated with a very statistically significant with practice score regarding Cardiac Catheterization

Recommendations

Based on findings, the study recommended

- Brochures on standard nursing techniques have to be accessible in all cardiac catheterization units to direct nurses in providing patients with appropriate care

- Simple graphics and posters regarding safety measures for patient post cardiac catheterization should be available in all cardiac units
- Sufficient number of highly qualified nurses must be on staff
- Continuous monitoring, assessing, and providing feedback on nurses' performance with reference to safety measures for patient post cardiac catheterization

Suggestion for further studies

- Further study is proposed to assess the effect of educational program on nurses' performance regarding safety measures for patient post cardiac catheterization
- A simple study should be replicated on a large sample and other place to generalize the findings

Table 1: Frequency and Percentage Distribution of the Studied Nurses Regarding Their Demographic Characteristics (n=50)

Demographic Characteristics	No.	%
Age (year):		
20-29	24	48.0
30-39	13	26.0
40-49	8	16.0
50-59 years	5	10.0
Mean± SD	33.34±9.79	
Gender:		
Male	9	18.0
Female	41	82.0
Marital status:		
Married	43	86.0
Single	7	14.0
Level of education:		
Nursing diploma	12	24.0
Technical nursing institute	19	38.0
Nursing Bachelor	14	28.0
Post-graduation degree	5	10.0
Years of experience		
1 < 5 years	21	42.0
5 < 10 years	11	22.0
>10 years	18	36.0
Mean± SD	6.62±4.04	

Pervious training courses related to cardiac catheterization:		
Yes	21	42.0
No	29	58.0
Monthly income:		
Enough	20	40.0
Not enough	30	60.0

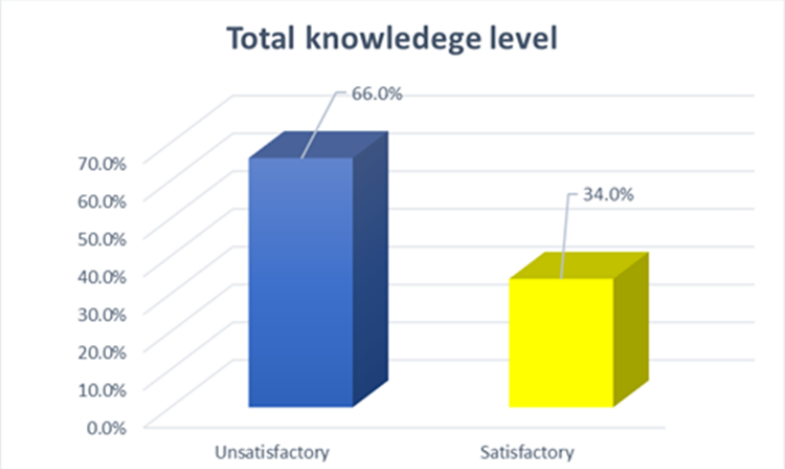

Figure 1: Total Nurses` Knowledge Regarding Cardiac Catheterization

Table 2: Frequency, Percentage and Mean Distribution of Total Factors Affecting Nursing Performance Related to Patient Safety After Cardiac Catheterization (N=50).

Items	No.	%	Mean ±SD	Range
Nursing related factors				
Negative effect <75%	7	14.0	10.56±1.19	(8-13)
Positive effect ≥75%	43	**86.0**		
Availability of Professional Support for Patient Care				
Negative effect <75%	23	46.0	3.58±1.14	(1-5)
Positive effect ≥75%	27	**54.0**		
Job Satisfaction				
Negative effect <75%	30	**60.0**	7.14±1.45	(4-10)
Positive effect ≥75%	20	40.0		
Patient Safety Measures				
Negative effect <75%	17	34.0	5.76±0. 95	(3-7)
Positive effect ≥75%	33	**66.0**		

Work Environment				
Negative effect <75%	13	26.0	11.36±2.27	(4-14)
Positive effect ≥75%	37	**74.0**		
Total Factors				
Negative effect<75%	13	26.0	38.40±4.41	(24-29)
Positive effect ≥75%	37	**74.0**		

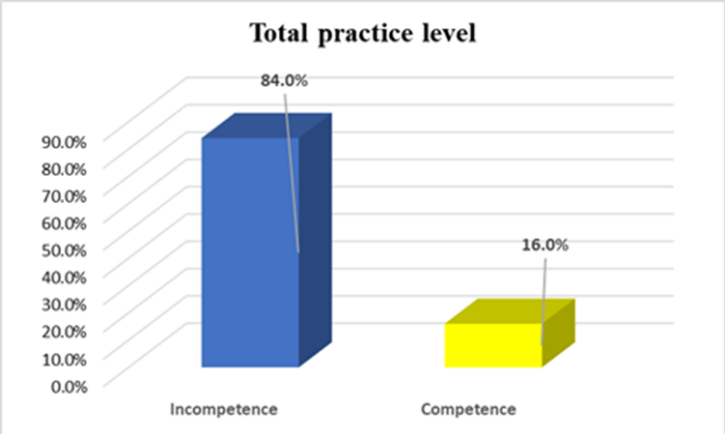

Figure 2: Total Nurses' Level of Practice Regarding Safety Measures for Patients Post Cardiac Catheterization

Table 3: Relation between Total Factors Affecting Nursing Performance and Demographic Characteristics Related to Patient Safety after Cardiac Catheterization (N=50)

Demographic Characteristics	Total Factors				χ^2	P-Value
	Positive effect		Negative effect			
	No.	%	No.	%		
Age (year):						
20-29						
30-39	14	37.0	10	20.0	6.338	0.09
40-49	11	22.0	2	4.0		
50-59 years	7	14.0	1	2.0		
	5	10.0	0	0.0		
Gender:						
Male	5	10.0	4	8.0	1.941	0.214
Female	32	64.0	9	18.0		
Marital status:						
Married	33	66.0	10	20.0	1.202	0.357
Single	4	8.0	3	6.0		

Educational level:						
Nursing Diploma	10	20.0	2	4.0		
Technical nursing institute	11	22.0	8	16.0	4.197	0. 244
Nursing Bachelor	12	24.0	2	4.0		
Post-graduation degree	4	8.0	1	2.0		
Years of experience:						
1 ≤ 5 years	11	22.0	10	20.0	8.810	0.013*
5 ≤ 10 years	10	20.0	1	2.0		
< 10 years	16	32.0	2	4.0		
Pervious training courses related to cardiac catheterization:						
Yes	18	36.0	3	6.0	2.582	0.191
No	19	38.0	10	20.0		
Monthly income:						
Enough	14	28.0	6	12.0	0.277	0.744
Not enough	23	46.0	7	14.0		

*Significant p ≤ 0.05 **highly significant p ≤ 0.01

Table 4: Correlation between total knowledge, total factors affecting performance and total practice among studied nurses regarding cardiac catheterization. (n=50)

Items	Spearman 's rank correlation coefficient			
	Total Knowledge		Total Practice	
	R	P	R	P
Total Knowledge	-	-	.331*	0.019
Total Factors	.545**	<0.001	.430**	0.002

(*) Statistically significant at p >0.5

References

1. **Abd Elawhabe H.S., Mohamed H.S., and Mohamed Khalil B.M. (2019).** Factors Affecting of Nurses Performance for Patients undergoing Cardiac Catheterization. *Egyptian Journal of Health Care*,10(4),Pp636-646
2. **Abd rabo, F,S. Taha, N,M. & Moghazy, N,A.2024.** Factor Affecting Nurses' Performance Regarding Nursing Management of Patients with Hepatic Encephalopathy. *Zagazig Nursing Journal*,20(1),184-204. https://doi.org/10.21608/ZNJ.2024.343687
3. **Ahmed M.M.A.S., Abdallah K.F., and Ebraheim M.N.(2018).**Nurses' Performance Regarding Patients' Safety after Cardiac Catheterization.Pp1-259
4. **Atta Z. T.M., Abood S A., and Ali R M. N. (2019)**.Nursing Staff' Perception Regarding Factors Influencing Their Performance in General Hospital. *Minia Scientific Nursing Journal*,6(1),Pp183-189
5. **Coomes A., Haghbayan H., and CheemaA. N. (2020).** Distal Trans radial access for cardiac catheterization: a systematic scoping review. Catheterization and Cardiovascular Interventions, 96(7):Pp1381-1389Rahman, H. Demir, O, M. Ryan, M. McConkey, H. Scannell, C. Ellis, H. & Perera, D. 2020. Optimal use of

Vasodilators for Diagnosis of Microvascular Angina in the Cardiac Catheterization laboratory. *Circulation: Cardiovascular Interventions,* 13:e009019 https://doi.org/10.1161/CIRCINTERVENTI ONS.120.009019.

6. **Gouda A.H., Mohammed E.T., and Ameen D.A.(2019).** Factors Affecting Postoperative Nursing Performance in The Surgical Units. *Egyptian Journal of Health Care*.10(1),Pp50-64
7. **Hamed, A,M. Shehata, A,E. Soliman, G,H. & Elwan, W,M.2023.** Effect of Patient's Safety Educational Program on Nurses' Performance for Patients Undergoing Cardiac Catheterization. *Menoufia Nursing Journal*,8(1),151-166. http://doi.org/10.21608/MENJ.2023.290973
8. **Hassan, A,M,A. Elhapashy, H,M,M. Sobeh, D,E,S. & Mohammed, Sh,E,M. 2021.** Effect of Nurse-Led Intervention on Anxiety and Fatigue among Patients undergoing Cardiac Catheterization. *Egyptian Journal of Health Care*, *12*(2),1616-1625. http://doi.org/10.21608/EJHC.2021.212771
9. **Henedy W. M., and El-Sayad H. E.(2019).** Nurses' Knowledge and practice regarding patient's safety Post Cardiac Catheterization. *IOSR Journal of Nursing and Health Science (IOSR-JNHS)*,8(3),Pp 43-52
10. **Jabr, E,M. Taha N,M.& Metwally E,A.2022.** Nurses' Knowledge and Practice Regarding Care for Patients Undergoing Cardiac Catheterization. *Zagazig Nursing Journal*,18(1),1-15. http://doi.org/10.21608/ZNJ.2022.216269
11. **Khaliel,W,E. Mohamed, S,S. & ElGhonaem, S,E.2022.** Evaluate nurses' performance regarding safety measures in cardiac catheterization unit at benha university hospital and suggested guidelines. *Journal of Nursing Science Benha University*, *3*(1), 64-77. http://doi.org/10.21608/JNSBU.2022.212762
12. **Marquis B. L., and Huston C. J. (2019).** Leadership roles and management functions in nursing. Theory and application. Wolters Kluwer
13. **Moghazy N.A., Fathy A.M.M., Taha N.M.,and Elsyed S.M.(2024).** Factors Affecting Nurses' Performance Regarding Prevention of Central Venous Line Associated Infection. *Cuestiones de Fisioterapia*, *53*(3), Pp1857-1871
14. **Mohamed, S,H.Fathy, A,T.& Mahmoud, D,M.2023.** Effect of an Intervention Protocol regarding Safety Measures on Knowledge, Practices and Attitude of Nurses Caring for patients undergoing cardiac catheterization. *Egyptian Journal of Health Care*,14(3),137-154. http://doi.org/10.21608/EJHC.2023.313533
15. **Rajesh, B. (2018):** Effectiveness of structured teaching program on knowledge and practice regarding patient safety after cardiac catheterization among cardiac nurses. Master's thesis at arvinth college of Nursing Namakkal. Retrived from https://www.semanticscholar.org Accessed on 17-3-2025 at 9pm
16. **Saad, S,E. Taha, N, M. Mohammed, E, H. & El sheshtawy, M,K. 2024.** Nurses' Role Regarding Care of Patients Undergoing Cardiac Catheterization. *Zagazig Nursing Journal*, *20*(1), 287-294. http://doi.org/10.21608/ZNJ.2024.350857
17. **Thabet O.F., Ghanem H.M.,Ahmed A.A.,and Abd-ElMouhsen S.A.(2019).** Effect of Developing and Implementing Nursing Care Standards on outcome of Patients Undergoing Cardiac Catheterization. *IOSR Journal of Nursing and Health Science (IOSR-JNHS),8(1),Pp42-54*