

## Evaluate Nurses' Performance Regarding Safety Measures In Cardiac Catheterization Unit at Benha university hospital And Suggested Guidelines

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### Abstract

**Background** : Cardiac catheterization is a diagnostic and interventional tool available to the cardiologist today. It may lead to several minor and more serious complications which may contribute to morbidity and mortality. The responsibility of the cardiac catheterization team is ensuring good patient care, safety without accidental harm as a result of a health care encounter. **Aim** : This study was conducted to evaluate nurses' performance regarding safety measures in cardiac catheterization unit. **Design** : Descriptive research design was used **Setting** : This study was conducted at cardiac catheterization unit, at Benha University Hospital. **Sample** : A convenience sample of 40 cardiac nurses were involved in the present study. **Tools** : structured interviewing questionnaire, observational checklist and safety attitude questionnaire sheet were developed to assess the knowledge, practice and attitude of cardiac nurses. **Results** : This study revealed that the majority of studied nurses more than half (60%) had unsatisfactory level of total knowledge & practice about safety measures in cardiac catheterization unit. while more than three-quarters (77.5%) of the studied nurses had positive attitude towards safety culture in cardiac catheterization unit **Conclusion** : knowledge level and practice of cardiac catheterization staff nurses regarding measures increase with years of experience. **Recommendations** : Strict observation of nurses during work and continuous evaluation of their performance and correction of poor performance is essential

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Key words: Cardiac Catheterization, Knowledge, Practices. And safety measures.

### Introduction

Cardiac catheterization (CC) is one of the most diagnostic and interventional tools and considered a today's gold standard for evaluating the heart problems. the CC procedures may be categorized as diagnostic or interventional, cardiac catheterization is performed to measure blood pressure, blood flow to the heart, the level of oxygen in the blood, blood samples and a biopsy of the heart muscle during the procedure. Cardiac catheterization is a medical procedure that cardiologists or heart specialists use to evaluate heart function and diagnose cardiovascular conditions (Moris, 2018).

The term cardiac catheterization can be used to refer to either right heart catheterization or left heart catheterization or both. The procedure can be either diagnostic or therapeutic and interventional, cardiologists can perform a variety of interventions depending on the clinical need (Hassan., 2017). A catheter procedure can be a diagnostic tool as well as a form of treatment for certain types of heart disease. Some types of heart disease stem from abnormalities in the heart's structure. They

may not be apparent immediately. Catheter procedures give surgeons an in-depth look at the arteries leading to the heart. They also allow them to correct structural problems that lead to irregular heartbeats, fatigue and other potentially life-threatening symptoms (Mariam et al., 2018).

The procedure typically involves a general anesthetic and is associated with varying complications. Although the advances in catheterization techniques have reduced the prevalence of complication Post cardiac catheter, statistics show that complications are remain a significant source of mortality in cardiac (Ancholy et al., 2018).

Cardiac catheterization done for check narrow or blocked blood vessels that could cause chest pain, measure the amount of oxygen in the heart (hemodynamic assessment). Evaluate and determine the need for further treatment. Also, it is performed in hospital by a cardiologist and a team of doctors, nurses, technicians and other medical professionals (Silber et al., 2019).

## **Aim of the study**

### **This study aimed to assess nurses' performance regarding safety measures in cardiac catheterization through:**

- 1- Assessing nurses' knowledge related to safety measures in cardiac catheterization.
- 2- Assessing nurses' practice related to safety measures in cardiac catheterization.
- 3- Assessing nurses' attitude related to safety culture in cardiac catheterization.

### **Research questions:**

1. What is the level of nurses' knowledge related to safety measures in cardiac catheterization.
2. What is the level of nurses' practice related to safety measures in cardiac catheterization.
3. What is the level of nurses' attitude related to safety culture in cardiac catheterization.

## **Subjects and Methods**

### **This study aimed to:**

Assess the nurses' performance regarding safety measures in cardiac catheterization unit at Benha University Hospital.

The aim of this study achieved through the following:

- Assessing the nurses' level of knowledge related to safety measures in the cardiac catheterization unit.
- Assessing the nurses' practice level related to safety measures in cardiac catheterization unit.
- Assessing the nurses' attitude related to safety culture.

### **Research design:-**

Descriptive explanatory research design was utilized to conduct the aim of this study .( explanatory measurement for the case where person properties and/or item properties are used to explain the effects of persons and/or items).

### **I: -Technical design:**

It included setting of the study, sample, and tools of data collection.

#### **❖ Setting:**

The study was conducted at the cardiac catheterization unit at Benha University Hospital. the cardiac catheterization unit locates in the first floor of the medical building. there are two cardiac catheter laboratory in the unit supported by equipment and X-rays devices and there are another four rooms in the unit which are nursing room, physicians' room, patient preparation room and recovery room.

#### **❖ Sample:**

convenient sample of all available nurses( 40) nurse from both sex who were working at mention setting during the time of data collection and agree to participate in this study

#### **❖ Tools of data collection:**

To achieve the purpose of the study there are three tools were used to collect data for this study.

### **Tool I: - Structured interviewing questionnaire(Appendix I):**

This tool used to assess nurses' knowledge regarding safety measures in cardiac catheterization unit. it is developed by the researcher after reviewing related literature and presented in simple Arabic structure items related to different aspects. It consisted of two parts:-

#### **Part I: - The nurses' socio-demographic characteristics:**

This part was conducted to identify of nurses' demographic characteristics such as age, sex, the educational level, marital status, and years of experience in the cardiac catheterization unit, attending training courses related to safety measures.

#### **Part II: - The nurses' knowledge Assessment:**

This part was conducted to assess the studied nurses' level of knowledge related to safety measures in the cardiac catheterization unit, it was in the form of multiple-choice question., which included two parts:

**I- The nurses' knowledge about nursing management during cardiac catheterization which included:**

**A-** The nurses' general knowledge about cardiac catheterization and included seven questions about the cardiac catheterization definition, types, Indication, Insertion site of cardiac catheter, The purpose ,Contraindication Duration time of cardiac catheterization procedure.

**B-**The nurses' knowledge about nursing management before, during and after cardiac catheterization procedure which included ten questions about the important nursing procedures that should be done before cardiac catheterization, important laboratory investigations that must be done before performing cardiac catheterization, and preparations for patient before performing cardiac catheterization , the type of anesthesia used during cardiac catheterization, nursing observation during iodine (dye) injection, nursing intervention during vein constriction, nursing observation post cardiac catheterization, and general complications that may occur to the patient immediately after cardiac catheterization ,Symptoms of bleeding after cardiac catheterization, Wound care on insertion site, Local complication that may occur after cardiac catheterization.

**II-The nurses' knowledge about the safety measures and standard precautions for infection control (safe work practice) which included :**

**A-** The nurses' knowledge about patient safety measures which included seven questions, about definition of safety measures, patient safety include , to maintain patient safety, patient identification correctly, high alert medication , Time of Patient identification, Avoiding in correct surgery to the patient.

**c-** The nurses' knowledge about environmental safety measures which included four questions about definition environmental safety measures, chemical safety measures, protection of the unit from outbreak or fire, environmental biological safety measures

**- Scoring system:**

The score distributed as: one mark for each correct answer and zero for incorrect answer, the total score converted into percentage and graded as the following:-

Total scores of knowledge = 38score

- Less than 80% graded as unsatisfactory level of knowledge.

- Equal or more than 80% graded as satisfactory level of knowledge.

**Tool II: - Observational Checklist for nurses' practice(Appendix II):**

It designed by the researcher aimed to assess the nurses' practices regarding safety measures in cardiac catheterization unit and included:

**A-**Patients' safety measures which included nursing care before cardiac catheterization procedure which contained (14 steps), nursing care during cardiac catheterization procedure which contained (8 steps), and nursing care after cardiac catheterization procedure which contained (14 steps).

-Patients' safety measures during drug administration which included (8steps), prevention of medication errors(MEs) (10 steps) and patients' safety measures during blood transfusion in cardiac catheterization unit which included (42 steps).

**B-** Nurses' safety measures which included infection control measures to protect nurses from infection such as:

- Hand washing (20 steps),
- Wearing the personal protective clothes (8 steps)
- Cleaning and disinfection (2 steps)
- Personal hygiene (4 steps)
- Healthy behavior (4 steps)
- Discard the solid materials (4 steps)
- Discard needles in sharp container (5 steps)
- Handling linen (2 steps)
- Radiation exposure hazard (3 steps items)
- Musculoskeletal injury hazard (4 steps).

**C-**Environmental safety measures checklist which included :

Mechanical safety (3 items)

Thermal safety (4 items),

Electrical safety (1item),

Bacteriological safety (2 items)

Chemical safety (2 items).

### Scoring system:

Practice score for each practice was given as follows:

1 = Done

0 = Not done

Total scores of practices = 174score

The total practices were considered satisfactory if the score of the total practices > 80% (139 score), and considered unsatisfactory if it is less than 80% (<139 score).

### Tool III: - Safety Attitudes Questionnaire (SAQ):

The Safety Attitudes Questionnaire (SAQ) was developed by **Sexton et al., (2000)**, and used to measure safety attitude for nurses. It included six domains; team work (6 items), safety climate (7 items), job satisfaction (5 items), stress recognition (11 items), perception of management (5 items), and working conditions (8items).

#### - Scoring system:

Scoring system was using a Likert scale to score (1= strongly disagree, 2 =slightly disagree, 3 = neutral,4 = slightly agree, and 5 = strongly agree).

Total score of attitudes = 210 score

The score of the items was summed-up and the total divided by the number of the items, giving a mean score for the part. These scores were converted into a percent score. The attitude was considered positive if the score of total attitudes >60 % (>126 score), and considered negative if it is <60 % (<126 score).

**Nurses' guidelines:** It was developed by the researcher after reviewing the related literature and according to the nurses' needs regarding to safety measures in cardiac catheterization unit. it included two main parts (theoretical and practical); **the theoretical part** included; the meaning of (safety measures, safety measures for patients, safety measures for medical staff, , environmental safety in cardiac catheterization unit ) . cardiac catheterization types, contraindications ,complications and the risks of cardiac catheterization, the nursing care before, during and after cardiac catheterization, and nursing instructions for patient post cardiac catheterization, while **the practical part** included; the infection control practices such as hand washing, the use of personal protective equipments, the process of cleaning, disinfection and sterilization, ccontrolling the environment, how to prevent radiation danger and structural strikes, the general safety measures in

hospitals, and the environmental safety measures in the cardiac catheterization unit.

### Reliability and content validity of the tools:-

Content validity of the suggested tools was done by a jury of five experts in Medical Surgical Nursing department in Faculty of Nursing Benha University to determine whether the included items are clear and suitable to achieve the aim of the current study. Their opinions elicited regarding the format, layout, consistency, accuracy and relevancy of the tools. Experts' judgment regarding the face and content validity of the nurses' assessment sheet to assess nurses' knowledge (n=5).

Items	Agree	Disagree	Agree with modification
1- Structured interview questionnaire is suitable to assessment of nurses' knowledge related to prevention of central line infection	100%	-	-
2- Content is related to objective.	100%	-	-
3- Content is comprehensive.	80%	-	20%
4-Statements are in logic consequence.	100%	-	-
5- Statements are appropriate.	100%	-	-
6- Statements are accurate.	100%	-	-
7- Statements are clear.	100%	-	-

Reliability of the tools was done by using Cronbach's Alpha coefficient test which revealed that each of the three tools consisted of relatively homogenous items as indicated by high reliability for each tool. The internal consistency of the tools was as the following:

Tools	Cronbach's Alpha
Structured interviewing questionnaire	0.89
Safety measures observational checklist	0.92

## **II:- Operational design:**

The operational design for this study consisted of four phases, preparatory phase, ethical considerations, pilot study, and fieldwork.

### **Preparatory phase:**

The preparatory phase included extensive reviewing of the related literature and studies related to present study using national and international resource in order to develop the appropriate tools of data collection and nursing guidelines.

The tools for data collection were developed after reviewing the recent related literatures of various aspects of the study using books, periodicals, magazines and internet...etc. in order to develop the data collection tool and nursing guidelines.

### **Ethical considerations:**

The ethical research considerations included the following:

- Oral consent was obtained from the studied nurses in order to participate in the study.
- The aim of the study explained to all the nurses and they were reassured that all information will be confidential and it will be used only for their benefit and for the research purpose.
- The studied nurses also informed that they are allowed to choose to participate or not in the study and they have the right to withdraw from the study at any time without any reasons giving.

### **Pilot study:**

A pilot study was conducted on 10% from the total number of the studied nurses (4) and they were included in the study. The pilot study was aimed to assess the feasibility, clarity, and applicability of the tools also to determine the time needed for filling the structured questionnaire. According to the results obtained from data analysis, the modifications, correction, omission and addition were done. The tools lasted about 30 minutes to be filled.

### **Field work:**

- Permission to carry out the study from responsible authorities in the faculty of

nursing at Benha University and hospital administration personnel after explanation of the purpose of the study was obtained. Interviewing with head nurse to clarify the aim of the study, nurses time schedule and assignment sheet.

-Interviewing with nurses before starting data collection procedure was conducted to establish a good relationship with them, explain the aim and nature of the study was done for them.

- The study was conducted over a period of 6 months which started from July 2020 to the end of December 2020; data were collected by interviewing the studied nurses in the cardiac catheterization unit at Benha University Hospital.
- Data collected at morning and afternoon shifts (long day shift) three days/week. Assessment of the nurses' practical skills through observational checklist(Tool II) was done by the researcher at time of patient preparation to cardiac catheterization, during cardiac catheterization and post cardiac catheterization ,medication administration, and blood transfusion procedure the researcher was observing nurses' practical skills about compliance of infection control measures and environmental safety measures. The time needed to complete the checklist ranged between 20-25 minutes
- Assessment of the nurses' knowledge through structured interviewing questionnaire(Tool I) was given to each nurse to fill it and time required for completion of the questionnaire was ranged from 20-25 minutes.
- Nurses attitude assessment sheet given to each nurse to fill it and time need about 5-10 min
- Nursing guidelines provided to the studied nurses according to their needs. Nurses were divided into small groups after their work, each group contained from 3 to 5 nurses and the guidelines were discussed with them and given to nurses. the researcher doesn't do post test after guide lines

### **III: - Administrative designed:**

An approval to carry out this study obtained from the dean of Faculty of Nursing Benha University and director of the department of cardiac catheterization unit at Benha University Hospital.

### **IV: - Statistical design:**

Statistical analysis was done by using Statistical Package for Social Sciences (SPSS) version 22. Data were collected, revised, coded, organized, tabulated, and analyzed using frequencies, number, percentage, mean scores, standard deviation. Data were presented in the form of tables and figures. Quantitative data was presented by mean ( $\bar{X}$ ) and standard deviation (SD). Qualitative data was presented in the form of frequency distribution tables, number and percent. It was analyzed by Chi-square test ( $X^2$ ) to detect the relation between the variables of the study (P-value).

Statistical significance was considered as follows:

- P-value > 0.05 Not significant
- P-value < 0.05 Significant
- P-value < 0.001 Highly significant

### **Results**

**Table (1):** showed that, 85% of the studied nurses their age ranged between 20-30 years, the Mean  $\pm$ SD of age was  $26.57 \pm 5.37$  year. As regard to educational level, 42.5% of them had technical institute Of nursing. Also, 50% of them were single. Likewise, 62.5% of the studied nurses their years of experience in the cardiac catheterization unit were < 5 year, with mean SD  $6.12 \pm 4.71$  year. Moreover, 87.5% of the studied sample were nurses. Also, 57.5% of the studied nurses not attended training courses related to the safety measures in the cardiac catheter unit.

**Table (2)** showed that, 67.5% of the studied nurses had satisfactory level of total knowledge regarding the general knowledge about cardiac catheterization While, 62.5% and 67.5% of them had unsatisfactory level of total knowledge regarding nursing management for cardiac catheterization procedure and nurses knowledge regarding safety measures .

**Table (3):**this table stated that, ( 80% & 90%) of the studied nurses had incompetent level of total practice regarding to practical skills before , during and after cardiac catheterization procedure, and environmental safety measures respectively . while (30%) had competent level of total practice regarding to infection control measures.

**Table (4):** This table showed that, more than three-quarters (85% and 77.5%) of the studied nurses had positive attitude towards teamwork climate and working condition. While, the majority(82.5% and 80%) of the studied nurses had negative attitude towards stress recognition and perceptions of management, respectively.

**Table (5)** illustrate that, there was highly significant positive correlation between nurses' knowledge and their total practice regarding safety measures in cardiac catheterization unit at ( $P = < 0.01$ ).while,there was significant negative correlation between nurses' attitude and their total knowledge and practice regarding safety measures in cardiac catheterization unit at ( $P = < 0.05$ ).

**Section1: Demographic Characteristic of the studied nurses**

**Table (1):** frequency distribution of studied nurses regarding to their demographic characteristics (n

<b>Items</b>	<b>N</b>	<b>%</b>
<b>Age (year)</b>		
20-30	34	85
30-40	4	10
41+	2	5
<b>Mean S.D</b>	<b>26.57 ± 5.37</b>	
<b>Educational level</b>		
Diploma degree of Nursing	8	20
Technical Institute of nursing	17	42.5
Bachelor degree of nursing	14	35
Post graduate	1	2.5
<b>Marital Status</b>		
Single	20	50
Married	17	42.5
Divorced	3	7.5
<b>Years of experience in the cardiac catheterization unit</b>		
< 5	25	62.5
5 - <10	10	25
10 <15	3	7.5
≥ 15	2	5
<b>Mean S.D</b>	<b>6.12 ± 4.71</b>	
<b>Job position</b>		
Nursing supervisor	1	2.5
Nursing specialist	4	10
Nurse	35	87.5
<b>training courses related to the safety measures</b>		
Yes	17	42.5
No	23	57.5
<b>If yes, How many training courses ? (n=17)</b>		
One	13	76.5
Two	3	17.6
Three and more	1	5.9

**Table (2):** Number and percentage distribution of the studied nurses according to total knowledge domains(n=40).

Items	Satisfactory		Unsatisfactory	
	N	%	N	%
General knowledge about cardiac catheterization	27	67.5	13	32.5
Nurses' knowledge about nursing management before, during & after cardiac catheterization procedure	15	37.5	25	62.5
Nurses' knowledge about the safety measures and standard precautions for infection control	13	32.5	27	67.5

**Table (3):** Number and percentage distribution of the studied nurses according to total practice domains(n=40).

Items	competent		In competent	
	N	%	N	%
Nurses' practice regarding to practical skills before , during and after cardiac catheterization procedure.	6	15	34	85
Nurses' practice regarding to drug administration safety measures & blood transfusion.	10	25	30	75
Nurses' practice regarding to infection control measures.	12	30	28	70
Nurses' practice regarding to environmental safety measures.	4	10	36	90

**Table (4):**Number and percentage distribution of the studied nurses according to total attitude domains(n=40).

Items	Positive		Negative	
	N	%	N	%
Teamwork climate	31	77.5	9	22.5
safety climate	27	67.5	13	32.5
job satisfaction	27	67.5	13	32.5
stress recognition	7	17.5	33	82.5
perceptions of management	8	20	32	80
working condition	34	85	6	15



**Table (5):** Correlation between total knowledge of the studied nurses and their total practice attitude regarding safety measures in cardiac catheterization unit.

	Total knowledge		Total Practice		Total attitude	
	r	p	R	p	r	P
Total knowledge			.354	.009**	-.173	.045*
Total Practice	.354	.009**			-.208	.032*
Total attitude	-.173	.045	-.208	.032		

### Discussion

**regarding to age of studied subjects,** the current study findings revealed that, more than three quarters of subjects were within age group that ranged from 20 to 30 years with the mean age  $26.57 \pm 5.37$ . This is in agreement with **Bayan (2018)** who conducted a study entitled (Nurses, Knowledge regarding cardiac catheterization at general hospital in Rania City) revealed that almost of the studied nurses was young adults from 26-30 year with mean age  $31.5 \pm 7.58$ . while, there is disagreement with (**Rushdy, et al. 2016**) that of who stated that the majority of the studied nurses were ranged between ( $30 \leq 40$ ) years. this may be due to newly graduated nursing in cardiac catheterization units.

**as regards to qualification or educational level,** the current study results clarified that more than one third had technical institute of nursing and bachelor degree of nursing and the majority of them were nurse. this findings is consisted with the study done by **Ali et al., (2015)** entitled (nurses' knowledge and practice regarding implantable device in Egypt) and found that the majority of the sample had technical institute nursing. also these results supported by the results of **Renato, (2018)** entitled \*complication associated with cardiac catheterization procedure \*who found that one third (33.1) of studied nurses had technical nursing institute.

regarding nurses total knowledge scores about safety measures in cardiac catheterization unit the study revealed that more than half (60%) of the studied nurses had unsatisfactory level of total knowledge regarding to safety measures while more than one third had satisfactory level of total knowledge regarding to safety measures. These results were similar to those of (**Thabet, 2019**)

who conducted study about effect of developing and implementing nursing care standards on nurses performance and outcome of patients undergoing cardiac catheterization, the study showed that more than two third of studied subject (67%) had unsatisfactory level of nurse's knowledge about standards safety precaution for patients undergoing cardiac catheterization.

These results were similar to those of **Hassan,(2017)** entitled "Assessment of Nurses Knowledge about Patient Safety after Cardiac Catheterization for Adult Patients in Ibn Al-Biter Specialist Center Cardiac Surgery," who found that more than two third had unsatisfactory level of total Knowledge. also(**Thapa and Neupane, 2018**) who conducted a study to assess the impact of teaching program on nurses knowledge concerning intra-aortic balloon pump (IABP) implantation therapy for coronary artery bypass grafting patients at selected hospitals in Dehradun and found that the majority of the studied nurses had reported undequate level of knowledge regarding IABP pre implementing the program

regarding nurses total practice scores about safety measures in cardiac catheterization unit the study revealed that more than two third (70%) of the studied nurses had incompliance level of total practice regarding to safety measures. these findings supported by the results of done by **Suominen, (2016)** entitled \*health care professionals, Knowledge and Attitudes regarding patient safety and skills for safe patient care\*who found that there was improvement in safety practice after health care professionals had received training.

the study revealed that, more than three-quarters (77.5%) of the studied nurses had positive

attitude towards total attitude towards safety measures in cardiac catheterization unit. While, less than one-quarters (22.5%) of them had negative attitude. these findings supported by the results of done by **Kaynar, et al (2019)** entitled\* Attitudes of Respiratory and Cardiac Therapists and Nurses about Measures to Prevent Post cardiac catheterization complication who found more than half of cardiac nurses had positive attitude toward safety culture to maintain patient safety post cardiac catheterizations.

correlation coefficient between total knowledge, attitude and practice scores , the present study revealed that there is positive correlation between total nurse's knowledge and total practice scores ( $p < 0.000$ ).which means that when knowledge of nurses using adequate information and demonstration will be achieve improvement in nurses' practice. these findings is supported by **Wahab,. et al (2016)** entitled \*(Nurses Knowledge, attitude, and practice regarding infection control in cardiac catheterization unit in port said hospital)\*who found that the educational programs about infection control precaution are significantly influenced the participants performance .to conclude , the research questions of the study about nurses safety measure knowledge , practice and attitude was answered and suggested guideline given to nurses working in cardiac catheterization unit in benha university hospital.

#### **Conclusion:**

□ there was highly statistically significant relation between total nurses' knowledge and educational level & years of experience at ( $P = < 0.01$ ).

□ there was highly statistically significant relation between total nurses' practice and their socio-demographic characteristics as educational level, years of experience in the cardiac catheterization unit, and attendance of training course at ( $P = < 0.01$ ).

□ there was highly statistically significant relation between total nurses' attitude and attendance of training course at ( $P = < 0.01$ ). also, there was statistically significant relation with years of experience in the cardiac catheterization unit at ( $P = < 0.05$ )there was highly significant positive correlation between nurses' knowledge and their total practice regarding safety measures in at ( $P = < 0.01$ ). while, there was significant negative

correlation between nurses' attitude and their total knowledge and practice regarding safety measures in cardiac catheterization unit at ( $P = < 0.05$ ).

□ The current study concluded that the knowledge level , practice and attitude of cardiac catheterization staff nurses increased with years of experience. Bachelor nurses had good level of knowledge and practice than institute and diploma nurses

#### **The study recommended the following:**

□ Strict observation of nurses during work and continuous evaluation of their performance and correction of poor performance is essential

□ Continuous training courses should be implemented for cardiac nurses to update their knowledge and practice regarding to patient's safety.

□ Application of patient's safety concepts courses in the nursing student's curriculum

□ the study should be replicated on large sample & different hospitals settings in order to detect and generalize the results.

□ study must be conducted to evaluate effect of an educational program regarding safety measures on patient outcomes and quality of provided care.

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