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Assessment of Nurses' Performance Regarding Early Ambulation of Children with Congenital Heart Defects Following Cardiac Catheterization

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Abstract

Background: After a cardiac catheterization, nurses are crucial in providing children with high-quality care and averting complications. **Aim:** To assess nurses' performance regarding early ambulation among children with congenital heart defects following cardiac catheterization. **Research design:** The study was conducted using a descriptive design. **Setting:** The current study was conducted at the cardiology unit at Beni- suef university Hospital. **Subjects: Sample:** A convenient sample of 30 nurses, who are working at the previously mentioned setting. **Tools:** three tools were utilized for data collection; 1st tool: An interviewing questionnaire sheet to assess the studied nurses' knowledge regarding early ambulation, 2nd tool: an observational checklists to assess the studied nurses' practices regarding early ambulation and 3rd tool: nurses' attitude toward early ambulation using 5-point Likert scale to assess the studied nurses' attitude regarding early ambulation. **Results:** Less than three-quarters had unsatisfactory knowledge about early ambulation, great majority of them had incompetent level of practices regarding early ambulation, and majority of them had negative attitudes toward early ambulation. **Conclusion:** less than three quarters of the studied nurses' had unsatisfactory knowledge about early ambulation, majority of them had incompetent level of practices regarding early ambulation, and vast majority of them had negative attitudes toward early ambulation. **Recommendation:** Design and implement an educational programs for pediatric nurses' in cardiology unit to raise their awareness regarding early ambulation providing in-service training regarding the advantages of early ambulation following cardiac catheterization in preventing complications.

Keywords: Cardiac catheterization, Children, Congenital heart defects, Early ambulation, Nurses.

Introduction

Congenital heart disease (CHD), a developmental disorder affecting the heart and major vessels, is a common condition in children. CHD is divided as cyanotic and acyanotic lesions. The greater availability of pediatric echocardiograms (Echo) and rising experience in handling children with CHD, both surgically and percutaneously, have contributed to improved children's outcomes. [1]

Over the past 20 years, improvements in medical care, surgery, and diagnostics have increased the survival rate of infants born with congenital heart disease. Among these therapeutic approaches include cardiac

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catheterization, medication, and open heart surgery. Early detection of problems and good care following CC are logically linked to taking action to get quick treatment and therefore reducing subsequent difficulties. [2]

Cardiac catheterization is a procedure involving the insertion of a catheter into the heart, used for diagnosing and treating various heart conditions. It carries the risk of both minor and major complications, which can impact patient health and lead to death. Timely identification of these complications and appropriate management is crucial for initiating quick treatment, which can help reduce the likelihood of additional complications [3]

Early ambulation is a nursing intervention to increase physical activity and maintain or improve the autonomy of body functions during surgical procedures or recovery from illness and prevent immobility complications. There is evidence that children who engage in early ambulation interventions have shorter hospital stays, lower rates of hospital readmission and reduced mortality rates. Moreover, early ambulation (EA) can reduce the incidence of muscle weakness, pneumonia, deep vein thrombosis, and pressure sores. [4]

Post-operative care often includes bed rest, and children, in particular, may be immobilized due to the nature of the surgery, leading to various complications. Recent developments in evidence-based early mobilization and personalized exercise regimens focus on improving patients' physical health, addressing issues such as pain management, hemodynamic stability, and oxygenation. These efforts prioritize physiological outcomes rather than psychological effects like reducing symptoms of restlessness, anxiety, and depression [5]

Providing high-quality nursing care for children in cardiology units requires a combination of professional knowledge and practical skills, given the complexity and specificity of the care needed. Nurses must understand the unique responses of these children, as they are integral members of the medical team. Critical care nurses have been known to play a key role in promoting early ambulation. In recent years, early ambulation following cardiac catheterization has become a significant and interesting focus for nurses. It is a common nursing responsibility, particularly in critical care settings. As such, early ambulation is a vital and essential task for critical care nurses caring for pediatric patients' post-cardiac surgery [7]

Significance of the Study:

Cardiac catheterization is a significant and widely recognized stressful event, causing considerable stress for both children and their families. The global prevalence of congenital heart defects (CHDs) is estimated at 9.41 per 1,000, marking a notable increase over the past fifteen years. Worldwide incidence of pediatric CC were 3,287 cases, of which 60% (n = 1,973) were interventional cases. Most of the cases (66%) were between the ages of 1 to 18 years with a median age of 4 years. PREDIC3T risk class 1 and 2 were most common in 37% and 38% of cases, respectively. Cardiac catheterization is among the most commonly performed cardiac procedures, with over 1,000,000 procedures conducted annually in the United States [8]. In Egypt, a study found that 79.2% of cases involved cyanotic CHD, while 20.8% were non-cyanotic. Ensuring high standards of nursing care during cardiac catheterization is a primary concern for the healthcare team, aiming to provide optimal care for pediatric patients and reduce complications following the procedure [9].

The effect of changing pediatric patients' position and early ambulation after cardiac catheterization increase levels of comfort and satisfaction and decrease level of fatigue, decrease the burden of health care resources significantly decrease the nursing staff workload, and reduce length of stay at hospital. [10] The optimal position and time of ambulation for child after cardiac catheterization are limited area of research specially at Beni- Suef . So, from the researcher point of view it is crucial to assess nurses' performance regarding early ambulation among children with congenital heart defects following cardiac catheterization.

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In Egypt, there are scarce studies conducted in the field of nursing care including early ambulation of children post cardiac catheterization. This study providing evidenced based data for post CC early ambulation is useful to anticipate and prevent post cardiac catheterization complications while minimizing utilization of hospital resources, so this study has two faces of benefits for pediatric nurses working in CC specialty as well as children undergoing cardiac catheterization.

Aim of the study

To assess nurses' performance regarding early ambulation among children with congenital heart defects following cardiac catheterization.

Research Questions:

- Are pediatric nurses' having satisfactory level of knowledge about early ambulation among children with congenital heart defects following cardiac catheterization?
- Are pediatric nurses' having competent level of practices regarding early ambulation among children with congenital heart defects following cardiac catheterization?
- What are the attitudes of pediatric nurses' toward early ambulation among children with congenital heart defects following cardiac catheterization?
- Is there a correlation between pediatric nurses' mean score of total knowledge, practices, and attitudes regarding early ambulation among children with congenital heart defects following cardiac catheterization?

Subjects and Method

Research design:

A descriptive study was applied to achieve the aim of the current study.

Research setting:

This study was conducted at the cardiology unit at Beni Suef University Hospital. The cardiology unit contains a reception hall to receive cardiac cases. It consists of two cardiac catheterization laboratory rooms, two rooms for preparation of pediatric patients before cardiac catheterization and receiving of them after cardiac catheterization called (pre &post rooms).

Subjects:

A convenient sample of 30 nurses, who are working at the above-mentioned setting.

Nurse's criteria

− The registered nurses who were employed full time to work

in the cardiology unit.

− Willing to participate in the study.

− Available at the time of data collection.

− Have worked at least six months in the cardiology unit before the study commencement.

− Excluding internship student.

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Tools of data collection

The data were collected through using the following tool:

1st tool: Designed Interviewing Questionnaire Sheet:

It was developed by the researcher after reviewing the related literature to assess the nurses' knowledge regarding early ambulation. It was written in an Arabic language and consists of a following part:

Part I: Characteristics of the studied nurses' who have cared for children post cardiac catheterizations which include: age, gender, qualification, years of experience, position and received formal training on early ambulation. It contained of six questions.

Part II: The studied nurses' level of knowledge regarding early ambulation that was covers three main sections including:**The first section** was concerned with knowledge about congenital heart defects as: definition, causes, symptoms, types, investigations, complications, treatment and prevention .It contained of ten questions . **The second section,** was knowledge about cardiac catheterization as definition, indications for diagnostic and therapeutic catheter, most common site of insertion, benefits, types, contraindications, complications and interventional procedures (tests) that done during cardiac catheter. It contained of eleven questions. **The third section,** was knowledge about early ambulation as definition , time, number of times of evaluation during early ambulation, criteria for initiating early ambulation, types of exercise, levels of activity performed, benefits, contraindications, criteria for termination of early ambulation, barriers, complications of immobility and facilitators to implement early ambulation. It contained of twenty questions.

Scoring system for nurses' knowledge:

A researcher-prepared key model answer was used to verify the nurses' knowledge; a complete, correct response received a score of (2), an incomplete, correct response received a score of (1), and a don't know response received a score of (0).The entire knowledge score, which ranged from 0 to 82, was attained. After converting the overall score to a percentage, it was divided into the following categories:

- Satisfactory knowledge (≥ 75%). It means (≥ 61.5grades).
- Unsatisfactory (< 75%). It means (<61.5grades).

2nd tool: Nurses' Practice toward Early Ambulation (Observational Checklist)

It was adapted from **Abouheiba et al., (2015) [11]; Reese and Bandy, (2023) [12]** to assess the nurses' practice regarding early ambulation . It contained 42 steps divided in to during the 1st 2hours containing 7 steps, during 3rd hour containing 6 steps, during 4th hour containing 24 steps and during 6th hour containing 5 steps including monitor vital signs, removing the sheath, observe the catheter site insertion, assess skin color and temperature, apply manual pressure to catheter site, position changes and lower extremity exercises as ante flexion and dorsiflexion of foot, Abduction, adduction and circumduction of the hip joint.

Scoring system for nurses' practice:

The scoring system of nurses 'observed practices were scored as complete done answer = (2), partial done (1) and not done = (0) zero. The total score of practices were summited, it was equal 84 score and the total score was converted into percentage and accordingly categorized as the following:

- Competent practices (≥ 85%). It means (≥ 71.4grades).
- Incompetent practices (< 85%). It means (< 71.4grades).

3rd tool: Nurses' Attitude toward Early Ambulation

It was adapted from **Lin et al.,(2020) [13] and Dweekat(2020) [14]** using 5-point Likert scale ranging from 1 to 5 points to assess the nurses' attitude regarding early ambulation. This tool contained 17 statement that reflect the nurses' attitude regarding early ambulation.

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Scoring system for nurses' attitude:

This part was contained 17 items with a total 85 grades. This instrument uses a 5-point Likert scale was assigned a score 1 (Strongly Disagree), 2 (Disagree), 3(Uncertain), 4 (Agree), 5 (Strongly Agree). These scores were summed and were converted into a percentage and accordingly categorized as the following:

- Positive attitude (≥ 60 %). It means (≥ 51grades).
- Negative attitude (<60 %). It means (< 51grades).

Tools validity and reliability:

A panel of three experts examined the content validity of the data collecting tools: one professor and two pediatric nursing assistant professors; one professor and one assistant professor from Helwan University; and one assistant professor from Beni-Suef University to test content validity of the tools and to judge its clarity, relevance, comprehensiveness, understanding and applicability. Tools were examined for their internal consistency by using Cronbach's coefficient alpha which is a model of internal consistency and reliability levels were 0.87 for tool (I), 0.85 for tool (II) and 0.72 for tool (III).

Pilot study:

A pilot study was carried out on 10% of the nurses (3) under the study at the previously mentioned setting to test clarity, applicability, relevance, feasibility of study tool, sequence of questions to maintain consistency and time needed to complete the study tools. Based on the result of the pilot study, rephrasing some questions was done to ensure clarity of the questions. So, it included in the main study sample.

Fieldwork

Before the study was carried out, the hospital's directors gave their official approval. The researcher met the nurses' and the aim of the study was explained to them. Their informed consent was secured before collecting data. The process of data collection carried out from the beginning of October 2022 to end of November 2023, and the researcher was available two days per week at cardiology unit Saturday and Wednesday from 8:00 a.m.–8:00 p.m. in the study setting until the completion of the questionnaire. The study was carried out by interviewing the nurses' in the previously mentioned settings. The time required for each nurse to fill out the questionnaire was about 20–30 minutes for knowledge, 20 minutes for attitude. The average time needed for completion of each observation (by researcher) was between10-20 minutes except practice during 4th hour need between20-30 minutes. The researcher re-checked each sheet after the nurses' completed it to make sure no data was missing.

Ethical considerations:

The Ethical Scientific Research Committee of Helwan University's Faculty of Nursing gave its approval to conduct the study, and the director of the cardiology unit at Beni Suef University Hospital also gave his consent. Before being included in the study, the nurses under study gave their approval, and a concise and understandable description of the study's purpose was provided based on their educational background. They made sure that all of the information collected would be kept private and utilized exclusively for research. The researcher guaranteed the confidentiality and anonymity of the nurses' data that was used in the study. The participants in the study were made aware of their freedom to opt out of the study at any moment and to choose whether or not to participate.

Statistical analysis:

Data entry and analysis were performed using Statistical Package for Social Sciences (SPSS) statistical software version 25 was used for data entry and analysis. Continuous data were expressed as (mean + SD), whilst categorical variables were expressed as numbers and percentages. The relationship between the row and column variables of the qualitative data was examined using chi-squared (x2). The correlation between quantitative variables was measured using Pearson correlation. The following levels of significance for the results were taken into

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consideration: Not significant (NS) is defined as a P-value > 0.05, statistically significant (S) as a P-value < 0.05, and highly statistically significant (HS) as a P-value ≤ 0.001.

Results

According to **Table 1,** 66.7% of the nurses in the study were female, and 70.0% of them were in the 25–30 age range. Additionally, 96.7% of them were staff nurses, 40.0% had a bachelor's degree in nursing, and 43.3% had graduated from a nursing institute. Furthermore, 100.0% of them did not participate in training programs, and 63.3% of them had five to ten years of experience.

Table (2) reveals that, 70.0%, 83.4% and 80.0% of the studied nurses had unsatisfactory level of knowledge regarding congenital heart defects, cardiac catheterization and early ambulation respectively.

According to **Figure 1,** 26.6% of the nurses in the study had satisfactory knowledge of early ambulation among children with congenital heart abnormalities after cardiac catheterization, whereas 73.4% of the nurses in the study had unsatisfactory knowledge.

Figure (2) clarifies that, 83.4% of the studied nurses had incompetent level of practices, while 16.6% of the studied nurses had competent level of practices regarding early ambulation among children with congenital heart defects following cardiac catheterization.

Figure (3) displays that, 90.0% of the studied nurses had negative attitude, and while 10.0% of the studied nurses had positive attitude regarding early ambulation among children with congenital heart defects following cardiac catheterization.

Table (3) demonstrates that, there was significant statistical positive correlation between level of knowledge and level of practice at P-value= 0.030. Also, there was a significant statistical positive correlation between level of knowledge and attitude at P-value= 0.037. Additionally, there was a significant statistical positive correlation between level of practice and attitude at P-value= 0.041.

Table (1): Distribution of characteristics of the studied nurses (n=30).

Socio- demographic characteristics	No	%
Age (in years)		
<25 years	6	20.0
25-30 years	21	**70.0**
>30 years	3	10.0
Mean ±SD	26.9 ±2.21	
Gender		
Male	10	33.3
Female	20	**66.7**
Qualification		
Nursing diploma	4	13.4
Nursing institute	13	**43.3**
Bachelor of nursing	12	**40.0**
Postgraduate	1	3.3
Other	0	0.0

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Current position		
Head nurse	0	0.0
Supervisor	1	3.3
Nurse	29	**96.7**
Experience years		
Less than 5 years	9	30.0
from 5- 10 years	19	**63.3**
More than 10 years	2	6.7
Mean ±SD	6.41±2.25	
Attending training courses		
Yes	0	0.0
No	30	**100.0**

Table (2): Distribution of the studied nurses according to their total level of knowledge regarding early ambulation among children with congenital heart defects following cardiac catheterization (n=30).

Domains of knowledge	**Satisfactory**		**Unsatisfactory**		**McNemar test & P-value**
	N	**%**	**N**	**%**	
Knowledge about Congenital heart defects	9	30.0	21	**70.0**	7.297 **0.000***
Knowledge about Cardiac catheterization	5	16.6	25	**83.4**	4.737 **0.000***
Knowledge about early ambulation	6	20.0	24	**80.0**	5.250 **0.000***

P-value > 0.05= Non-significant (NS) ***P-value ≤ 0.05= Significant (S**

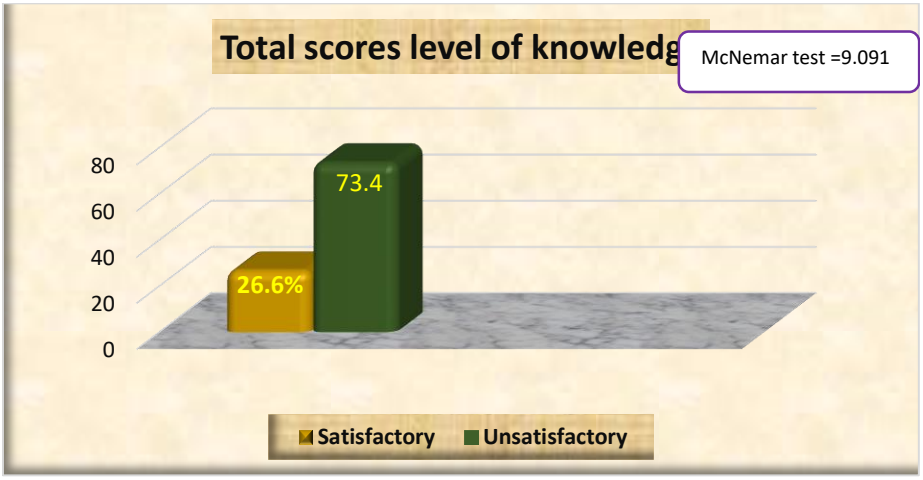

Figure (1): Percentage distribution of the studied nurses according to their level of knowledge regarding early ambulation among children with congenital heart defects following cardiac catheterization (n=30).

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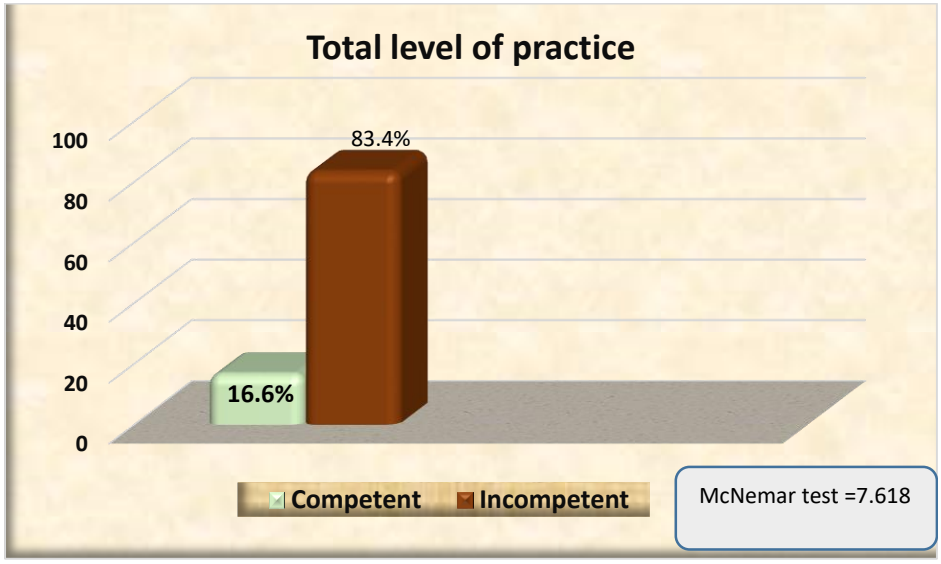

Figure (2): Total level of practices of the studied nurses regarding early ambulation among children with congenital heart defects following cardiac catheterization (n=30).

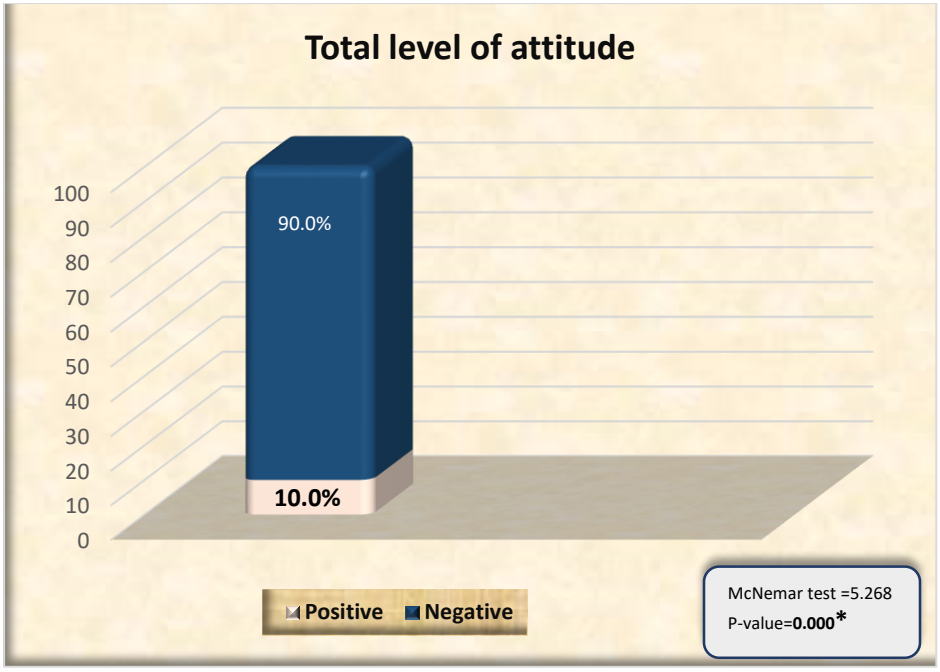

Figure (3): Percentage distribution of the studied nurses according to their total level of attitude regarding early ambulation among children with congenital heart defects following cardiac catheterization (n=30).

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Table (3): Correlation between total level of knowledge, practice and attitude among the studied nurses regarding early ambulation among children with congenital heart defects following cardiac catheterization (n=30).

Variables (Total level)	Knowledge		Practice	
	r	P-value	r	P-value
Practice	0.551	**0.030* (S)**		
Attitude	0.461	**0.037* (S)**	0.418	**0.041* (S)**

P-value > 0.05= Non-significant (NS) ***P-value ≤ 0.05= Significant (S)**

Discussion

Congenital heart disease (CHD) is the most prevalent birth defect, affecting roughly 1 in every 120–166 newborns. Thanks to advancements in both palliative and corrective surgeries, the survival rate of children with CHD into adulthood has risen significantly. However, despite these improvements, CHD continues to be the leading cause of death among children with congenital abnormalities [15]

Early ambulation is a safe and effective approach to reduce the adverse effects of bed rest and functional impairments in children following cardiac catheterization. Studies have shown that early mobilization can improve recovery outcomes after the procedure. Despite the increasing evidence supporting early ambulation for pediatric patients' post-cardiac catheterization, many cardiology units have yet to incorporate this practice into their routine care for children. Research consistently highlights early ambulation as a beneficial intervention that significantly enhances functional outcomes [16]

Nursing care is critical to the survival of pediatric patients and helps to reduce post-cardiac catheterization problems. As a result, nurses' competency is critical in terms of knowledge, practice, and attitude toward pediatric patient care following cardiac catheterization. [17] As a result, the purpose of this study was to evaluate nurses' performance in terms of early ambulation among children with congenital heart abnormalities after cardiac catheterization.

Regarding the studied nurses' characteristics, According to the current study, less than two thirds of nurses had five to ten years of experience, and more than two thirds were in the 25–30 age range. The majority of the nurses were juniors, according to this finding. From the perspective of the investigator, this could be explained by the nature of the cardiology unit, which is an area that particularly requires young, qualified nurses to provide higher-quality nursing care and be able to handle the workload. Young nurses have the advantage of being energetic, which is usually necessary in such vital or critical wards.

The findings previously mentioned are consistent with those of **Thabet et al.** [10], who stated in his thesis at Asssuit University Hospital that the nurses under study were more than 25–30 years old, and their years of experience ranged from five to ten years, with a mean ±SD 7.18± 4.25.The results of a study by **Jabr et al.** [18] on "Nurses' Knowledge and Practice Regarding Care for Patients Undergoing Cardiac Catheterization" showed that over two-

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thirds of the nurses in the study were over thirty years old, with ages ranging from 25 to 45 years old and mean ± SD 33.78 ± 6.0. Additionally, over half of the nurses had more than ten years of intensive care unit experience.

In terms of gender, the current study found that two-thirds of the nurses under investigation were female. This could be because women made up a larger percentage of Egypt's nursing workforce. It could also be because, until recently, nursing was solely offered to women in Egyptian universities, and nursing is still mostly seen as a feminine career. This result is in line with that of **Faried et al. [**19], who discovered that two-thirds of the nurses in their study were female, while just one-third were male. This could be because women predominate in the nursing field and men have only recently begun to enter the field.

This finding contrasts with that of **Mahmood et al.** [20], who studied "Nurses' Knowledge of Patient Care After Cardiac Catheterization in Mosul Hospitals" and found that most of their sample members were male. However, their sample age groups differed, with the majority of them being between the ages of 25 and 29.

In terms of the nurses' qualifications, the current study found that over two-fifths of the samples had a nursing degree from a technical institute, and two-fifths had a bachelor's degree. From the perspective of the researcher, this might be because government hospitals have a large number of bedside nurses because of a staff nurse shortage. **Henedy & El-Sayad** concurred with these findings. [21] The purpose of the study was to "assess cardiac nurse's knowledge and practices regarding patient's safety post cardiac catheterization." The majority of the nurses in the study held bachelor's and technical institute degrees in nursing.

Yaqoob et al. [22] demonstrated conflict in another study by demonstrating that the majority of their examined samples had nursing diplomas. From the perspective of the researcher, this contradiction is connected to the Beni Suef Governorate University Hospital's policy of assigning top-notch nurses to critical care and specialty units.

All of the nurses in the study had not taken any training courses on early ambulation of children with congenital heart abnormalities after cardiac catheterization, according to the nurses' attendance at prior training sessions. According to the researcher, the lack of training programs may be the cause of the lack of interest in training and ongoing education within the units as well as the shortage of nursing staff, which contributes to work overload. The lack of nursing specialists also makes it difficult for hospital and nursing administrators to pay attention to the significance of in-service and external educational training programs.

This previously finding is in accordance with **Omer.**[23]conducted a study to "assess the Quality of Pre-Cardiac Catheterization Nursing Care at the Surgical Specialty Hospital -Cardiac Center in Erbil City'' and found that no training sessions are given regarding pediatric cardiac catheterization for most of the study samples. This is inconsistent with **Abd Elawhabe et al.** [24] who studied" Factors affecting of nurses performance for patients undergoing cardiac catheterization" and reported that nearly two thirds of the studied nurses had received training courses regarding cardiac catheterization.

The current study clarified that, with regard to students' overall scores of knowledge regarding early ambulation of children with congenital heart defects after cardiac catheterization, less than three-quarters of the nurses under study had unsatisfactory knowledge, while nearly one-quarter had satisfactory knowledge. According to the researcher, this might be because nurses are unaware of the significance of early ambulation and how it affects recovery and results. This issue made it clear that pediatric nurses need ongoing in-service training on early ambulation.

These findings were consistent with **Rahane & Williams.** [25] Who found that majority of the staff nurses did not have adequate knowledge regarding coronary angiogram care. The overall level of knowledge revealed that many less than two thirds needs improvement. Additionally, **Pandit et al.** [26] in his study to measure "cardiac nurses' knowledge and practice following cardiac catheterization" found that less than three quarters of nurses had unsatisfactory level of knowledge about cardiac catheterization.

This finding was not matched with **Karthi et al.** [27] who constructed a study about "Assess the Knowledge and Practice among Cardiac Nurses about Patient Safety after Cardiac Catheterization, Tamilnadu" and indicated that

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the level of knowledge among 30 samples the level of nurses' frequency and percentages was adequate less than three quarters, moderately adequate less than one quarter, inadequate minority with mean 7.53 and standard deviation 1.33.

On investigating nurses' practices regarding early ambulation of children with congenital heart defects following cardiac catheterization, the results of the current study showed that, with regard to early ambulation, less than one quarter of the nurses were competent, while the great majority experienced incompetence. According to the researcher, this might be because there aren't any in-service training programs for nurses, nurses are working more, and there isn't an EM protocol to regulate nursing practice in the study settings.

These results were consistent with those of **Sania et al**. [28], who discovered that nearly two thirds of nurses lacked sufficient practice. Additionally, a study conducted in Pakistan by **Omran & Shawq** [29] revealed that the majority of nurses lacked the necessary skills to ensure the safety of children after cardiac catheterization. On the other hand, this result contradicted the findings of the study conducted by **Karthi et al**. [27], which showed that the frequency and percentages of practice among 30 samples of nurses were good nearly two thirds, Average more than one quarter, and poor minority with mean 15.6 and standard deviation 3.21.

The current study found that, with regard to the nurses' overall scores level of attitude regarding early ambulation of children with congenital heart defects after cardiac catheterization, the majority of the nurses under study had a negative attitude toward early ambulation, while a minority had a positive attitude. This might be because the participants had negative attitudes or sentiments about early ambulation and were afraid to move kids too soon after heart catheterization because they thought it would hurt them more than help them and cause problems. These findings are consistent with those of **Hasballah et al.** [30] Who showed that less than one quarter of nurses had a favorable attitude toward patient safety and more than three quarters had a negative attitude about it in cardiac catheterization unit.

According to the current study, there was a significant statistical positive correlation between the total scores of the studied students' knowledge, practices, and attitude regarding early ambulation of children with congenital heart defects after cardiac catheterization and the total scores of the nurses who were the subjects of the study. The P-values for these factors were 0.030, 0.037, and 0.041, respectively. This clarifies how a nurse's knowledge directly affects their work, and knowledge is necessary to attain optimal practices.

The findings of **Huang et al. [**31], who reported a statistically significant positive association between total knowledge scores, total practice scores, and total attitude scores, were consistent with this outcome. This result was also consistent with the findings of a study conducted by **Goda et al. [**32], which examined the "Assessment of Nurses' Performance in Care of Children with Critical Cardiac Conditions" and made clear that the sample under study had a notably low degree of knowledge, attitude, and practice about caring for children with critical cardiac conditions.

Another view by **Taşdelen et al. [33]** survey, who found that, there wasn't a significant correlation between awareness level and attitude among their study participants. Also, the result of **Indarwati et al. [34]** who stated that the nurses' who has low level of knowledge not necessarily has low level of attitude.

Conclusion:

Based on the results it can be concluded that:

It is possible to draw the following conclusions based on the current study's findings and the responses to the research questions: fewer than three-quarters of the nurses under study had unsatisfactory knowledge of early ambulation, whereas almost one-quarter had satisfactory knowledge. When it came to early ambulation, the vast majority of the nurses in the study had negative attitudes, whereas a small percentage had good attitudes. Vast majority of the studied nurses had incompetent level of practice, while less than one quarter of them had competent level of practice regarding early ambulation. Also, there was significant statistical positive correlation between the studied

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students' total level of knowledge, practices, and attitudes regarding early ambulation among children with congenital heart defects following cardiac catheterization.

Recommendations

On the light of the current study findings the following recommendations are suggested:

1. Create and implement an educational program to increase the awareness of early ambulation among pediatric nurses in the cardiology unit. This program should include in-service training sessions about the advantages of early ambulation following cardiac catheterization in preventing problems.
2. In order to stay up to date on the latest developments and skills in the field, nurses should be encouraged to attend certain meetings, such as workshops and seminars, that are held for early ambulation following cardiac catheterization.
3. To assess the proficiency of nurses working in cardiac catheterization units, nurses' knowledge and practices regarding early ambulation are periodically monitored.

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