MOSUL JOURNAL OF NURSING
Online ISSN: 2663-0311 - Print ISSN: 2311-8784
Website: https://mjn.mosuljournals.com

RESEARCH ARTICLE

ASSESSMENT OF NURSE'S KNOWLEDGE AND PRACTICES REGARDING PEDIATRIC CARDIAC CATHETERIZATION AT SULAIMANI CARDIAC HOSPITAL IN SULAIMANI CITY

Sabah Qadir Aziz [1], Pary Mahamad Azize [2] *

1. *Sulaimani Cardiac Hospital , Sulaimani, Iraq.*
2. *Pediatric Nursing Department, technical institute, Sulaimani technical institute , Sulaimani, Iraq.*

Corresponding author: Sabah Qadir Aziz
Email: sabahb.sc@gmail.com

ORCID

ABSTRACT
Pediatric Cardiac catheterization is considered one of the most diagnostic and interventional procedures available to the cardiologist. Pediatric Cardiac Catheterization has decreased morbidity and mortality for cardiovascular defects, and this invasive process is not free of complications.

Aim: To assess the nurse's knowledge and practices regarding pediatric cardiac catheterization Sulaimani City.

Methods: A Descriptive -analytical designs are used in the current study. A purposive non-probability sample of (30) Nurses were recruited who worked in Sulaimani Cardiac Hospital. The present study shows that most participants were males aged between (45-49). years. The study demonstrated that nurses' knowledge in pediatric cardiac catheterization was satisfied, and more than half of them worked with "good practice.

Results: the study's result indicates a significant positive statistical correlation between (nurses' knowledge and Nurses' practice at Pre-cardiac, Intra-cardiac, Post-cardiac).

Conclusions: The present study shows that most participants were male aged between(45-49). Years. The study demonstrated that nurse's knowledge in pediatric cardiac catheterization was satisfied, and more than half of them worked with "good practice." Further, the study's result indicates a significant positive statistical correlation between (nurse's knowledge and nurse's practice at Pre-cardiac, Intra-cardiac, Post-cardiac). The study recommends a specific training course for all the nurses working with children undergoing pediatric cardiac catheterization, and also further qualitative studies are also recommended.

Keywords: *Assessment, Pediatric, cardiac, catheterization, Pre, intra, post , cardiac hospital.*

This work is licensed under a Creative Commons Attribution Non-Commercial 4.0 International License.

Received: 13 September 2021, Accepted: 07 December 2021, Available online: 20 January 2022

INTRODUCTION

Pediatric Cardiac catheterization is considered one of the most diagnostic and interventional procedures available to the cardiologist. It includes inserting a specialized catheter into the systemic circulation (usually through the femoral vein or artery of the puncture site), which is then guided into the heart supported by the x-ray.This procedure is safe when a knowledgeable team achieves it.The complications are usually brief and may consist of minor complications as abnormal heartbeats,reaction to dye or medications,bruising,temporary pain,minor infections,and bleeding(Hasballah et al., 2014).

Cardiac catheterization in the pediatric community has similarities with catheterization in adults. However, visible differences in adults, the coronary atherosclerotic disease is more common and extremely rare in pediatrics. The techniques, interventions, and indications performed in pediatrics are different. A variety of therapeutic procedures was done in the pediatric cardiac catheterization lab, including balloon angioplasty of stenotic lesions, embolization and device closure of vessels, device closure of septal defects, and valvuloplasty of stenotic valves stenting vascular stenosis, and even percutaneous pulmonary valve implantation. An entire patient assessment is required and determines the best sedation (Gaze, D. C. (Ed.). 2018).

There is also a probability of more severe but uncommon complications, including hematoma, severe bleeding, blood vessel or nerve damage, irregular heart rhythms and lung or heart failure, stroke, heart attack, blood clots in the lungs or legs (Keshk and Elgazzar, 2018).

Patients undergoing pediatric cardiac catheterization need a knowledgeable nurse who recognizes and spots the complications, Using an appropriate practice of nursing care that will assist the patients to cope successfully with their situation and reduce their vascular complications (Thabet et al., 2019).

This invasive process is not free of complications. However, it is safe when a knowledgeable team achieves it. The complications are usually brief and may consist of minor complications as abnormal heartbeats, reaction to dye or medications, bruising, temporary pain, minor infections, and bleeding put (Omer, 2020). There is also a probability of more severe but uncommon complications, including hematoma, severe bleeding, blood vessel or nerve damage, irregular heart rhythms and lung or heart failure, stroke, heart attack, blood clots in the legs or lungs, and renal failure (Keshk and Elgazzar, 2018). Therefore, this study led to assess the socio-demographic data of the nurses who work in the Cardiac center and the quality of the nursing care regarding pediatric cardiac catheterization.

Objectives of the study

1. Identify the level of nurse's knowledge during pre-intra and post nursing care for child undergoing cardiac catheterization
2. Determine the level of nurse's practice regarding child's care following pediatric cardiac catheterization
3. Find the association between nurse's characteristics and each of nurse's level of knowledge and practices
4. The corlation between the level of knowledge and practice during cardiac catheterization procedure

METHOD

-Design of the Study

A quantitative design "descriptive" study case-control approach was carried out to achieve the objectives of study among participants.

-Setting of the Study

The present study was conducted at Sulaimani Cardiac Hospital in Sulaimani City.

-Sample of the Study

A probability and convenience sampling method was used to select a sample from the study. A sample of (30) male and female health care workers who work in Sulaymaniyah Heart Hospital / Catheterization Unit are those who worked before, intra, and after the pediatric cardiac catheterization,

-Criteria of the Study Sample

1- Health care workers who agreed to participate in the study.
2- Both genders
3- health care workers in (pre, intra, and post) pediatric cardiac catheterization

-The study instrument

In order to collect the correct data,questionnaire form was developed by researcher based on related review of literature, and previous studies, to measure the variables underline the present study. It consists of three parts:-

Part one: Socio-demographic characteristics of mother consist of (6) items, which include: age, gender, level of education, number of years employed, Have attended Training course about pediatric cardiac catheterization.

Part two: For the nurse's Knowledge in the Pediatric Cardiac Catheterization,A questionnaire was conducted and modified by the researchers, which consists of 48 items to assess level knowledge nurse's abutted the congenital heart defect and management of the defect items have been scaled by three levels of Likert scales by as the following patterns the For items (33) has been positives scaled and items (15) has been negative scaled

Part Nurses' practice regarding care of patients undergoing cardiac catheterization consists of three sections Section A Structured (Pre-cardiac catheterization) consists of (9) items, Section B (Intra-pediatric cardiac catheterization)consists of (12) items and Section C (Post-pediatrics catheterization) consists of (13) items, the questionnaire Nurses' practice items have been scaled The SPSS (version 24) was used for the data analysis. The demographic characteristics of the samples were reported by using descriptive statistics (frequencies, percentages, and mean) and chi-square test used for associations.

-Validity of the study tools

content validity of the questionnaire was analyzed via the panel of 12 experts of different specialties, including (Nursing, Medicine) (. The questionnaire was sent to them by a copy of the questionnaire to each and asked them to investigate the instrument for clarity, relevancy, and adequacy to achieve the purpose of the study. Their comments, suggestions, and amendments were taken into consideration.

Pilot study

A pilot study was conducted on (5) by the nurses who deal with pediatric patients undergoing cardiac catheterization at Sulaimani Cardiac Hospital during the first two weeks of February 2021. The sample of the pilot study was included in the study sample.

The purpose of the pilot study was:

- To confirm the clarity of the structure of the instrument throughout the subjects ,understanding and determining required
- modification was necessary for the questionnaire.
- To estimate the average time consumed for the data collection of each subject.
- To enhance the validity and determine the reliability of the instrument.

The result of the pilot study showed that

1. The time required for each observation was approximately 3 hours, range (1-2 hours)
2. Some items of the questionnaire which were not valid or did not have a significant value have been modified.

-Data Collection

Before interviewing the nurse, an introduction was given, and the purpose of the study was presented personally by the researcher to the subjects and to achieve verbal informed consent, and data was collected from the period 1st of February 2021 to 1st of November 2021.

Statistical analysis

All statistical computation is enhanced using statistical method (SPSS 24). The data had been coded, tabulated, and presented in a descriptive form. In this study the data were analyzed by using the basic statistical methods which include:

1. alpha-cronbach has been used for testing the reliability of the questionnaire.
2.Descriptive statistical data analysis(Frequency, percentage, Mean and stranded deviation)
3. Inferential data analysis:

A- Parametric Test (In dependent samples T-Test and One Way ANOVA –F-Test)
B- Spearman rank Correlation
C. Chi square: using multiple responses package
-The significant level of all statistical procedures was determined at (F test), P< 0.000.
- There are criteria of the probability level of determining the significance of test:P-value as: High significant (P< 0.001) , Significant (P< 0.05) , Non-significant (P> 0.05)And Very highly significant (P< 0.000)

RESULTS

Table (1) shows that the Distribution of the sample according to Socio demographic characteristic. As a result represents that, the majority of the age was between 40- 44 years which was 33.3% of the total and 26.7% was between 45-49 years and only 23.3% was Less than 40 years old. Most participants, 63.3% of gender was Male and 36.7% was females. In addition, the highest rate of the Level of education was Nursing institute Graduated which was 66.7% and 23.3% has Nursing preliminary Graduated. Then, the majority of the Years' employment was between 15 – 25 Years and 56.7% has 4 – 8 Years of Experience in care of Pediatric Cardiac Catheterization and 30% has Years of Experience in care of Pediatric Cardiac Catheterization

Table (2) on repeat distributions (mean, stander deviation) indicate explanatory variables that focus on (nurse's Knowledge in the Pediatric Cardiac Catheterization). This variable has a mean of 2.2. And a standard deviation of (0.7) .The percentage of people who responded with "good Knowledge were (67.3%), whose with

"Average knowledge" were (7.4%) and (25.3%) with "poor knowledge" .

Table (3) repeat distributions (mean, stander deviation) indicate explanatory variables that focus on (Nurses' practice regarding care of patients undergoing Pre-cardiac catheterization). This variable has a mean of 2.42. And a standard deviation of (0.71) .The percentage of people who worked with "good practice" were (65.56%), those with "Average practice" by (11.11%) and (23.33%) of them were in a "poor practice".

Table (4) on repeat distributions (mean, stander deviation) indicate explanatory variables that focus on (Nurses' practice regarding care of patients undergoing Intra-pediatric cardiac catheterization). This variable has a mean of 2.61. And a standard deviation of (0.69) .The percentage of people who worked with "good practice" were (77.5%), those who worked in (Average practice) by (6.1%) and who were (poor practice) by (16.4%)

Table (5) on repeat distributions (mean, stander deviation) indicate explanatory variables that focus on (Nurses' practice regarding care of patients undergoing post-pediatric cardiac catheterization). This variable has a mean of 2.41. And a standard deviation of (0.46) The percentage of people who worked with "good practice" were (61.03%), (18.97%) who were with "Average practice" and (20%) with "poor practice" .

Table (7) shows the Comparison means between nurse's knowledge and Socio demographic.The result of the study shows that, there were statistically significant differences between nurse's knowledge in Level of education (p=0.000), Years' employment (p=0.012) and Years of Experience in care of Pediatric Cardiac Catheterization (p=0.005) because the result of the p-value was less than the common alpha 0.05. But there were no statistically significant differences between nurse's knowledge in age (p=0.078), gender (p=0.401), because (p-value >0.05) .

Table (8) showsThe result of the study shows that, there were statistically significant differences between Nurses' practice at Pre-cardiac catheterization in age (p=0.001), Level of education (p=0.001), Years' employment (p=0.000) and Years of Experience in care of Pediatric Cardiac Catheterization (p=0.000) because (p-value <0.05). But there were no statistically significant differences between Nurses' practice at Pre-cardiac catheterization in gender (p=0.363) because the result of the p-value was more than the common alpha 0.05.

Table (9) shows the result of the study shows that, there were statistically significant differences between Nurses' practice at intra-cardiac catheterization in age (p=0.033), Level of education (p=0.000), Years' employment (p=0.017) and Years of Experience in care of Pediatric Cardiac Catheterization (p=0.001) because the result of the p-value was less than the common alpha 0.05.But there were no statistically significant differences between Nurses' practice at Intra-cardiac catheterization in gender (p=0.817) because (p-value >0.05).

Table (10) shows the result of the study shows that, there were statistically significant differences between Nurses' practice at post-cardiac catheterization in age (p=0.009), Level of education (p=0.000), Years' employment (p=0.031) and Years of Experience in care of Pediatric Cardiac Catheterization (p=0.002) because (p-value <0.05). But there were no statistically significant differences between Nurses' practice at post-cardiac catheterization in gender (p=0.265) because the result of the p-value was more than the common alpha 0.05.

Table(11) The result of the study indicates that that there is a significant positive statistical correlation between (nurses' knowledge and Nurses' practice at Pre-cardiac, Intra-cardiac, Post-cardiac,) which was (0.683, 0.762, 0.527) and that the significance value was (0.000, 0.000, 0.003) by respectively and were less than 0.05.

Table 1.Distribution of the sample according to Socio demographic characteristic

Variables	Items	Frequency	%
Age	Less than 40 years old	7	23.3
	40- 44 years	10	33.3
	45-49 years	8	26.7
	More than 49 years old	5	16.7
	Mean ±S.D	43.4 ~43 ± 4.77	
Gender	Male	19	63.3
	Female	11	36.7
Level of education	Nursing school Graduated	3	10.0
	Nursing preliminary Graduated	7	23.3

	Nursing institute Graduated	20	66.7
	College of nursing Graduated	0	0.0
	Post-Graduated	0	0.0
Years' employment	< 15 year	5	16.7
	15 – 25 Years	20	66.7
	Above 25 years	5	16.7
	Mean ±S.D	20.36 ~ 20 ± 5.87	
Years of Experience in care of Pediatric Cardiac Catheterization	< 4 year	4	13.3
	4 – 8 Years	17	56.7
	Above 8 years	9	30.0
	Mean ±S.D	6.77 ~ 7 ± 2.43	
Have you attended Training course about pediatric cardiac catheterization	No	30	100.0
	Yes	0	0.0
Total		**30**	**100**

Table 2.Distribution of sample according to nurse's Knowledge in the Pediatric Cardiac Catheterization

Items	False	I don't know	True	PN	AN	GN	Mean±S.D	Result
	N(%)	N(%)	N(%)	N(%)	N(%)	N(%)		
The indication on pediatric cardiac catheterization								
To intervene in congenital heart defect	0(0.0)	0(0.0)	30(100)	0(0.0)	0(0.0)	30(100)	3.0±0.00	GN
To measure cardiac input	13(43.3)	3(10)	14(46.7)	14(46.7)	3(10)	13(43.3)	1.97±0.96	AN
To measure pressure and oxygen saturations	14(46.7)	2(6.7)	14(46.7)	14(46.7)	2(6.7)	14(46.7)	2.00±0.98	AN
Measures intra-cardiac temperature	27(90)	2(6.7)	1(3.3)	1(3.3)	2(6.7)	27(90)	2.87±0.43	GN
The complication of pediatric cardiac catheterization								
Pain	17(56.7)	1(3.3)	12(40)	17(56.7)	1(3.3)	12(40)	1.83±0.99	AN
Allergic reaction	3(10)	1(3.3)	26(66.7)	3(10)	1(3.3)	26(66.7)	2.77±0.63	GN
Bleeding at catheter insertion site	4(13.3)	0(0.0)	26(86.7)	4(13.3)	0(0.0)	26(86.7)	2.73±0.69	GN
Infection	22(73.3)	0(0.0)	8(26.7)	22(73.3)	0(0.0)	8(26.7)	1.53±0.9	PN
cyanotic congenital heart defects include								
Tetralogy of Fallot (TOF)	6(20)	3(10)	21(70)	6(20)	3(10)	21(70)	2.5±0.82	GN
Atrial septal defect (ASD)	12(40)	3(10)	15(50)	15(50)	3(10)	12(40)	1.9±0.96	AN
Truncus arteiosus	12(40)	8(26.7)	10(33.3)	12(40)	8(26.7)	10(33.3)	1.93±0.87	AN
Atrioventricular septal defect	8(26.7)	8(26.7)	14(46.6)	14(46.6)	8(26.7)	8(26.7)	1.8±0.85	AN
The Following Investigation may help in diagnosis of congenital heart disease								
Echocardiogram	0(0.0)	0(0.0)	30(100)	0(0.0)	0(0.0)	30(100)	3.00±0.00	GN
EEG (electroencephalogram)	10(33.3)	1(3.3)	19(63.3)	10(33.3)	1(3.3)	19(63.3)	2.3±0.95	AN
CT – scan angiographe	16(53.3)	4(13.3)	10(33.3)	16(53.3)	4(13.3)	10(33.3)	1.8±0.92	AN
Cardiac catheterization	0(0.0)	0(0.0)	30(100)	0(0.0)	0(0.0)	30(100)	3.00±0.00	GN
A cyanotic congenital heart defect include								
Ventricular septal defect (VSD)	13(43.3)	10(33.3)	7(23.3)	13(43.3)	10(33.3)	7(23.3)	1.8±0.81	AN
Total Anomalous pulmonary venous connection	9(30)	5(16.7)	16(53.3)	16(53.3)	5(16.7)	9(30)	1.77±0.89	AN
Patent Ducts Arteriosus(PDA)	11(36.7)	6(20)	13(43.3)	11(36.7)	6(20)	13(43.3)	2.07±0.91	AN
Transposition of great arteries	7(23.3)	6(20)	17(56.7)	17(56.7)	6(20)	7(23.3)	1.67±0.84	AN
The following are signs and symptoms of Congenital heart defects								
Blue-tinted nails or lips	0(0.0)	0(0.0)	30(100)	0(0.0)	0(0.0)	30(100)	3.00±0.00	GN
Fast or troubled breathing	1(0.0)	0(0.0)	29(96.7)	1(0.0)	0(0.0)	29(96.7)	2.93±0.37	GN
Tiredness when feeding	2(6.7)	1(3.3)	27(90)	2(6.7)	1(3.3)	27(90)	2.83±0.53	GN
Not gain weight	6(20)	6(20)	18(60)	6(20)	6(20)	18(60)	2.4±0.81	GN
Congenital heart defects include								
pulmonary congestion	16(53.3)	1(3.3)	13(43.3)	13(43.3)	1(3.3)	16(53.3)	2.1±0.99	AN
coarctation of the aorta	2(6.7)	0(0.0)	28(93.3)	2(6.7)	0(0.0)	28(93.3)	2.87±0.51	GN

pulmonary edema	15(50)	3(10)	12(40)	12(40)	3(10)	15(50)	2.1±0.96	AN
transposition of the great arteries	3(10)	2(6.7)	25(83.3)	3(10)	2(6.7)	25(83.3)	2.73±0.64	GN
Treatment for congenital heart defect may include								
Surgery	3(10)	3(10)	24(80)	3(10)	3(10)	24(80)	2.7±0.65	GN
Procedures using catheterization	2(6.7)	0(0.0)	28(93.3)	2(6.7)	0(0.0)	28(93.3)	2.87±0.51	GN
Medications	10(33.3)	1(3.3)	19(63.3)	10(33.3)	1(3.3)	19(63.3)	2.3±0.95	AN
Dialysis	28(93.3)	2(6.7)	0(0.0)	0(0.0)	2(6.7)	28(93.3)	2.93±0.25	GN
If the patient has bleeding								
Notify physician	6(20)	0(0.0)	24(80)	6(20)	0(0.0)	24(80)	2.6±0.81	GN
Apply manual compression over the hematoma	0(0.0)	0(0.0)	30(100)	0(0.0)	0(0.0)	30(100)	3.00±0.00	GN
If patient has a heparin infusion, stop infusion	0(0.0)	0(0.0)	30(100)	0(0.0)	0(0.0)	30(100)	3.00±0.00	GN
Reinforce pressure bandage	1(3.3)	1(3.3)	28(93.4)	1(3.3)	1(3.3)	28(93.4)	2.9±0.4	GN
procedures performed in the pediatric cardiac catheterization								
Balloon angioplasty	4(13.3)	0(0.0)	26(86.7)	4(13.3)	0(0.0)	26(86.7)	2.73±0.69	GN
Device closuer	1(3.3)	0(0.0)	29(96.7)	1(3.3)	0(0.0)	29(96.7)	2.93±0.37	GN
ASD closuer	9(30)	2(6.7)	19(63.3)	9(30)	2(6.7)	19(63.3)	2.33±0.92	AN
Diagnostic catheterization	7(23.3)	1(3.3)	22(73.4)	7(23.3)	1(3.3)	22(73.4)	2.5±0.86	GN
When you detected hematoma at the puncture sit you should								
Apply pressure bandage	1(3.3)	0(0.0)	29(96.7)	1(3.3)	0(0.0)	29(96.7)	2.93±0.37	GN
Apply ice pack	8(26.7)	7(23.3)	15(50)	15(50)	7(23.3)	8(26.7)	1.77±0.86	AN
Elevated the bruised extremity	22(73.3)	3(10)	5(16.7)	5(16.7)	3(10)	22(73.3)	2.57±0.77	GN
Low the bruised limb	27(90)	2(6.7)	1(3.3)	1(3.3)	2(6.7)	27(90)	2.87±0.43	GN
What is the the sign of the thrombus formation after cardiac catheterization								
Pain at the puncture site	5(16.7)	0(0.0)	25(83.3)	25(83.3)	0(0.0)	5(16.7)	1.33±0.76	PN
itch at the puncture site	16(53.3)	6(20)	8(26.7)	8(26.7)	6(20)	16(53.3)	2.27±0.87	GN
Absent of the distal plus	2(6.7)	1(3.3)	27(90)	2(6.7)	1(3.3)	27(90)	2.83±0.53	GN
Capillary reflex time increase	21(70)	1(3.3)	8(26.7)	21(70)	1(3.3)	8(26.7)	1.57±0.89	PN
Total	422(29.3	106(7.4)	912(63.3	365(25.3	106(7.4)	969(67.3	2.2±0.7	AN

S.D: Stander deviation , P.N : Poor knowledge, F.N: Average knowledge. G.N: Good knowledge
Weight average (mean) for 3point Likert scales: 1.0-1.66 : Poor knowledge , 1.67-2.33: Average knowledge,2.34-3.0: Good knowledge

Table 3 . Distribution of sample according to Nurses' practice regarding care of patients undergoing cardiac catheterization

Questions / Pre-cardiac catheterization		poor practice	**Average** practice	Good practice	**Mean (S.D)**	**Results**
		Not Done	**Did Not do Well**	**Done**		
Assess parents' and child's understanding of the catheterization procedure	N	26	2	2	1.2 (0.55)	poor practice
	%	86.6	6.7	6.7		
Inform the parents to get their child not to eat nor drink anything for at least 6 hours	N	4	0	26	2.73 (0.69)	Good practice
	%	13.3	0.0	86.7		
Check if the patient has a cannula on	N	0	0	30	3.00 (0.00)	Good practice
	%	0.0	0.0	100		
Ensure consent paperwork is accurately completed	N	6	1	23	2.57 (0.82)	Good practice
	%	20	3.3	76.7		
Check the patient's documents for the lab test	N	2	5	23	2.7	Good practice

	%	6.7	16.7	76.6	(0.6)	
Monitor and document patient vital signs	N	7	11	12	2.17	**Average** practice
	%	23.3	36.7	40	(0.79)	
Check the patients previous diagnostic Echo cardiogram report	N	12	1	17	2.16	**Average** practice
	%	40	3.3	56.7	(0.98)	
Check if the name and date of birth is correct	N	2	1	27	2.83	Good practice
	%	6.7	3.3	90	(0.53)	
Update patient charting and document on the procedure	N	4	9	17	2.43	Good practice
	%	13.3	30	56.7	(0.73)	
Sum	**N**	**63**	**30**	**177**	2.42	Good practice
	%	**23.33**	**11.11**	**65.56**	(0.71)	

S.D: Stander deviation ,

Weight average (mean) for 3point Likert scales: 1.0-1.66 : Poor practice , 1.67-2.33: Average practice,2.34-3.0: Good practice

Table 4. Distribution of sample according to Nurses' practice regarding care of patients undergoing cardiac catheterization

Questions / Intra-pediatric cardiac catheterization		poor practice	**Average** practice	Good practice	**Mean (S.D)**	**Results**
		Not done	**Did Not do Well**	**Done**		
The nurse discusses with the physician about the procedure	N	26	0	4	1.27	poor practice
	%	86.7	0.0	13.3	(0.69)	
The nurse prepares all equipment's and supplements that are needed for the procedure	N	0	6	24	2.8	Good practice
	%	0.0	20	80	(0.41)	
The nurses should wash their hands before the operation	N	12	7	11	1.97	**Average** practice
	%	40	23.3	36.7	(0.89)	
The nurse should check the temperature of the operation room	N	13	1	16	2.1	**Average** practice
	%	43.3	3.3	53.4	(0.99)	
The nurse sterilize the side of the puncture	N	0	0	30	3.00	Good practice
	%	0.0	0.0	100	(0.00)	
The nurse connects the patient for cardiac monitor	N	0	0	30	3.00	Good practice
	%	0.0	0.0	100	(0.00)	
The nurse cover the patient with the sterile towel	N	0	0	30	3.00	Good practice
	%	0.0	0.0	100	(0.00)	
The nurse starts flushing all the line with the normal saline to remove the air	N	0	0	30	3.00	Good practice
	%	0.0	0.0	100	(0.00)	
The nurse assists the physician during the procedure	N	0	0	30	3.00	Good practice
	%	0.0	0.0	100	(0.00)	
	N	1	0	29	2.93	

The nurse puts pressure and observes the site of the puncture for any (bleeding, hematoma)	%	3.3	0.0	96.7	(0.37)	Good practice
The nurse applies the dressing over the puncture site with some pressure	N	0	0	30	3.00	Good practice
	%	0.0	0.0	100	(0.00)	
The nurse transfers the patient to the ward and indorses to another nurse for continued care and monitoring	N	7	8	15	2.27	Good practice
	%	23.3	26.7	50	(0.83)	
Sum	N	**59**	**22**	**279**	2.61	Good practice
	%	**16.4**	**6.1**	**77.5**	(0.69)	

S.D: Stander deviation ,

Weight average (mean) for 3point Likert scales: 1.0-1.66 : Poor practice , 1.67-2.33: Average practice,2.34-3.0: Good practice

Table 5. Distribution of sample according to Nurses' practice regarding care of patients undergoing cardiac catheterization

Questions / Post-pediatrics catheterization		poor practice	**Average** practice	Good practice	**Mean**	**Results**
		Not done	**Did Not do Well**	**Done**	**(S.D)**	
Before the patient returns to the unit the nurse should ensure that all equipment are available to evaluate and maintain the patient once arrived	N	3	19	8	2.17	Good practice
	%	10	63.3	26.7	(0.59)	
Encourage parents of infants and young children to hold their children as an acceptable option for resting in bed.	N	1	2	27	2.87	Good practice
	%	3.3	6.7	90	(0.43)	
Encourage bed rest and keep affected extremity straight or slight bend for 2-4 hours	N	1	1	28	2.9	Good practice
	%	3.3	3.3	93.4	(0.4)	
while the child is drowsy start giving medication as prescribed by the physician (antibiotic, pain relief, fluid)	N	1	0	29	2.93	Good practice
	%	3.3	0.0	96.7	(0.37)	
assess the catheterization site dressing to make sure the patient's puncture site is not bleeding/hematoma	N	1	6	23	2.73	Good practice
	%	3.3	20	76.7	(0.52)	
Monitor vital signs every 15 minutes for 1 hour and every 30 minutes next hour, then hourly.	N	8	22	0	1.73	**Average** practice
	%	26.7	73.3	0.0	(0.45)	
Assess affected extremity, noting its color, temperature, and capillary refill	N	5	16	9	2.13	**Average** practice
	%	16.7	53.3	30	(0.68)	
Provide warmth for the patient	N	2	1	27	2.83	Good practice
	%	6.7	3.3	90	(0.53)	
while the child is fully awake start to give fluid and soft diet	N	2	1	27	2.83	Good practice
	%	6.7	3.3	90	(0.53)	
Allow parents to accompany the child and be with the child when awake postoperatively.	N	0	0	30	3.00	Good practice
	%	0.0	0.0	100	(0.00)	
Instruct parents to observe and notify any sign of bleeding immediately	N	0	2	28	2.93	Good practice
	%	0.0	6.7	93.3	(0.25)	
Educate parents that pressure dressing well be removed after 24 hours and that they should continue to assess the site	N	26	2	2	1.2	poor practice
	%	86.6	6.7	6.7	(0.55)	

Post-cardiac Catheterization Assess pulses DISTAL to the cath insertion extremity	N	28	2	0	1.07	poor practice
	%	93.3	6.7	0.0	(0.26)	
Sum	**N**	**78**	**74**	**238**	2.41	Good practice
	%	**20**	**18.97**	**61.03**	(0.46)	

S.D: Stander deviation ,

Weight average (mean) for 3point Likert scales: 1.0-1.66 : Poor practice , 1.67-2.33: Average practice,2.34-3.0: Good practice

Table 6. Distribution of sample according to scales of level knowledge nurse's and Nurses' practice regarding care of patients undergoing cardiac catheterization

Items	Questions	Scales	N (%)
knowledge nurse's	48	Good knowledge	969(67.3)
		Average knowledge	106(7.4)
		Poor knowledge	365(25.3)
Total of the response		30*48=1440	1440 (100%)
Nurses' practice regarding care of patients undergoing cardiac catheterization			
Pre-cardiac catheterization	9	Good practice (Good done)	177(65.56)
		Average practice (Did Not do Well)	30(11.11)
		poor practice (Not done)	63(23.33)
Total of the response		30*9=270	270(100%)
Intra-pediatric cardiac catheterization	12	Good practice (Good done)	279(77.5)
		Average practice (Did Not do Well)	22(6.1)
		poor practice (Not done)	59(16.4)
Total of the response		30*12=360	360(100%)
Post-pediatrics catheterization	13	Good practice (Good done)	238(61.03)
		Average practice (Did Not do Well)	74(18.97)
		poor practice (Not done)	78(20)
Total of the response		30*13=390	390(100%)
samples (n) =30			

Table 7. Comparison means between nurse's knowledge and Socio demographic

Variables	Items	N	Mean	S.D	Significant Test
Age	Less than 40 years old	7	2.2833	0.04796	F-Test= 2.549 p-value=0.078
	40- 44 years	10	2.4141	0.05275	
	45-49 years	8	2.4833	0.14692	
	More than 49 years old	5	2.4315	0.19790	
Gender	Male	19	2.4024	0.11949	T-Test= -0.854 p-value=0.401
	Female	11	2.4489	0.17906	
Level of education	Nursing school Graduated	3	2.2153	0.04337	F-Test= 12.983 p-value=0.000
	Nursing preliminary Graduated	7	2.3155	0.03050	
	Nursing institute Graduated	20	2.4865	0.12413	
Years' employment	< 15 year	5	2.3083	0.18126	F-Test= 5.253 p-value=0.012
	15 – 25 Years	20	2.4115	0.12051	
	Above 25 years	5	2.5625	0.07065	
	< 4 year	4	2.2292	0.04501	F-Test= 6.44

Years of Experience in care of Pediatric Cardiac Catheterization	4 – 8 Years	17	2.4265	0.10289	p-value=0.005
	Above 8 years	9	2.4907	0.16800	

Table 8. Comparison means between Nurses' practice at Pre-cardiac catheterization and Socio demographic

Variables	Items	N	Mean	S.D	Significant Test
Age	Less than 40 years old	7	1.8889	0.30429	F-Test= 8.211
	40- 44 years	10	2.4722	0.09849	p-value=0.001
	45-49 years	8	2.7000	0.07499	
	More than 49 years old	5	2.3492	0.56082	
Gender	Male	19	2.4737	0.31826	T-Test= 0.925
	Female	11	2.3333	0.51640	p-value=0.363
Level of education	Nursing school Graduated	3	1.5556	0.19245	F-Test= 99.065
	Nursing preliminary Graduated	7	2.1111	0.19245	p-value=0.000
	Nursing institute Graduated	20	2.6611	0.11667	
Years' employment	< 15 year	5	1.8667	0.54659	F-Test= 10.305
	15 – 25 Years	20	2.4944	0.27330	p-value=0.000
	Above 25 years	5	2.6889	0.04969	
Years of Experience in care of Pediatric Cardiac Catheterization	< 4 year	4	1.6389	0.22906	F-Test= 39.168
	4 – 8 Years	17	2.4314	0.25118	p-value=0.000
	Above 8 years	9	2.7531	0.04900	

Table 9. Comparison means between Socio demographic and Nurses' practice at Intra-pediatric cardiac catheterization

Variables	Items	N	Mean	S.D	Significant Test
Age	Less than 40 years old	7	2.4333	0.06972	F-Test= 3.395
	40- 44 years	10	2.5938	0.06954	p-value=0.033
	45-49 years	8	2.7083	0.14299	
	More than 49 years old	5	2.6190	0.26289	
Gender	Male	19	2.6053	0.13276	T-Test= -0.234
	Female	11	2.6212	0.24257	p-value=0.817
Level of education	Nursing school Graduated	3	2.3056	0.12729	F-Test= 20.213
	Nursing preliminary Graduated	7	2.4881	0.03150	p-value=0.000
	Nursing institute Graduated	20	2.7000	0.13079	
Years' employment	< 15 year	5	2.4333	0.24580	F-Test= 4.761
	15 – 25 Years	20	2.6250	0.13653	p-value=0.017
	Above 25 years	5	2.7333	0.13693	
Years of Experience in care of Pediatric Cardiac Catheterization	< 4 year	4	2.3333	0.11785	F-Test= 15.39
	4 – 8 Years	17	2.6029	0.09560	p-value=0.001
	Above 8 years	9	2.7500	0.17180	

Table 10. Comparison means between Socio demographic and Nurses' practice at Post-pediatrics catheterization

Variables	Items	N	Mean	S.D	Significant Test
Age	Less than 40 years old	7	2.2923	0.03440	F-Test= 4.709
	40- 44 years	10	2.3750	0.02720	p-value=0.009
	45-49 years	8	2.4923	0.03972	
	More than 49 years old	5	2.4176	0.20283	
Gender	Male	19	2.4291	0.10670	T-Test= 1.138
	Female	11	2.3776	0.13955	p-value=0.265
Level of education	Nursing school Graduated	3	2.2051	0.11750	F-Test= 23.088
	Nursing preliminary Graduated	7	2.3187	0.02907	p-value=0.000

	Nursing institute Graduated	20	2.4731	0.08000	
Years' employment	< 15 year	5	2.2923	0.16677	F-Test= 3.973
	15 – 25 Years	20	2.4231	0.10440	p-value=0.031
	Above 25 years	5	2.4769	0.03440	
Years of Experience in care of Pediatric Cardiac Catheterization	< 4 year	4	2.2308	0.10879	F-Test= 15.88
	4 – 8 Years	17	2.3982	0.09513	p-value=0.002
	Above 8 years	9	2.5128	0.03846	

Table 11. Correlation between nurses' knowledge and Nurses' practice

Nurses' practice	Nurses' Knowledge	
	Correlation	P-value
Pre	0.683	0.000
Intra	0.762	0.000
Post	0.527	0.003
The level of significance at level 0.05 Correlation : Spearman's rank correlation		

DISCUSSION

Nursing care is one of the most crucial factors, preventing cardiac catheterization complications experienced by patients. In Kurdistan Region, a particular hospital, which focuses on Pediatric Cardiac Catherization does not exist as there are no specialized nurses who are certified in this specific field. Thus, nurses' knowledge and practices are competent in pre,intra, and post pediatric cardiac catheterization at Sulaimani cardiac hospital. It is essential to study. The Nurse plays an essential role in providing nursing care to the patient who undergoes cardiac catheterization. According to socio-demographic factors, the distribution of the sample discovered that 33.3% of the participants were aged between 45-49 years, and 26.7% were between 40- 44 years, and only 16.7% were Less than 40 years old. The majority of participants, 63.3%, were male. This result is supported by the descriptive crosse sectional study done in Mosul Hospitals (Mahmood et al., 2021). as their sample were primarily male; however, they differ in sample age groups as most of them were aged between 25-29 years old.

Regarding the educational level, the current study showed that most participants hold a technical institute degree in nursing, estimated as 66.7%, and 23.3% have preliminary nursing graduates. This conclusion supported a study conducted in Eygpt by (Ali et al., 2015).Further(Feroze et al., 2017),(Keshk & Elgazzar,2018), Which were agreed, reported that more than half of nurses had a general nursing diploma according to their qualification. The experience in nursing and the duration of work for nurses in this center revealed that most of the nurses were 4 – 8 Years experienced in pediatric cardiac catheterization, and the minority had more than nine years of experience in the care of Pediatric Cardiac Catheterization. These findings confirm the study done in Baghdad (Zaki,2010),which indicated that the maximum percentage of job experience was ranged between (1-10) years. However, (Omer,2020). the study conducted in the capital of Kurdistan Region to assess the Quality of Pre-Cardiac Catheterization Nursing Care at the Surgical Specialty Hospital -Cardiac Center in Erbil City supports the present study that no training sessions are given regarding pediatric cardiac catheterization for most of the study samples (55.5%) in Kurdistan region or abroad.

The study demonstrated that nurses' knowledge in pediatric cardiac catheterization was satisfied, as the percentage of nurses who responded with "good Knowledge were (67.3%), whose with "Average knowledge" were (7.4%) and (25.3%) with "poor knowledge." This finding agreed with another study done in Al-Najaf All-Ashraf City, which shows nurses' knowledge regarding cardiac patient care was good (Al-Ftlawy,2014). This finding has come along with a cross-sectional analysis done in Pakistan indicating that registered nurses have the proper level of knowledge regarding cardiac catheter care patients (Feroze et al., 2017). However, this finding contradicts the study results done in Mosul Hospital, which indicated that nurses working in medical and surgical ward nurses' Knowledge of Patient Safety After Cardiac Catheterization were unacceptable (Mahmood et al., 2021). Thwassults showed that most nurses had good knowledge about post-cardiac catheterization complications. A similar study done in Egypt to determine the Nurse's knowledge found that nurses had good knowledge about cardiac patient care (Ali et al., 2015). Nurses' knowledge was excellent and sufficient about cardiac catheterization procedures. Inconsistent with the present study, a study conducted in the cardiac unit in Palestine to determine the Nurse's knowledge about

pacemaker implantation showed similar results (Alkaiyat et al., 2019).

Regarding the Nurse's practices, the percentage of people who worked with "good practice" was (65.56%), those with "Average practice" by (11.11%) and (23.33%) of them were in a "poor practice" the result of the study done in Erbil found that overall quality of pre cardiac catheterization nursing care, 81.8% of the nurses were at an acceptable level compared to 18.2% were at a reasonable level. At the same time, the mean score of overall quality of care was 2.18, indicating an acceptable level of patient care. This contrasts with the cross-sectional analytical study in Pakistan (Yaqoob et al., 2019). that most nurses were observed with unsatisfactory practices. The outcome of the study indicates that there were statistically significant differences between Nurse's knowledge in Level of education (p=0.000), Years' employment (p=0.012), and Years of Experience in care of Pediatric Cardiac Catheterization (p=0.005). This conclusion is supported by the study done in Rania city, Kirkuk, and Khartoum city by (Sharif, et al., 2018) (Sameen, 2018) (Aziz & Lafi, 2011).

In contrast, (Hasballah, et al., 2019). stated that no significant correlation existed between gender, age, job experience, and marital status; negative correlations were also found between practice and years of experience.

The mean of knowledge was found suitable compared to the mean of practice, which was poor. The outcome of the study indicates that there were statistically significant differences between Nurses' practice at Pre-cardiac catheterization in age (p=0.001), Level of education (p=0.001), Years' employment (p=0.000), and Years of Experience in care of Pediatric Cardiac Catheterization (p=0.000) because (p-value <0.05). Nevertheless, no statistically significant differences have been found between Nurses' practice at Pre-cardiac catheterization in gender (p=0.363).

The outcome of the study shows that there were statistically significant differences between Nurses' practice at intra-cardiac catheterization in age (p=0.033), Level of education (p=0.000), Years' employment (p=0.017), and Years of Experience in care of Pediatric Cardiac Catheterization (p=0.001). This finding is supported by the study (Mahmood et al., 2021). which stated that the Level of Nurse's knowledge and practice of cardiac catheterization regarding patient safety increase with experience of the job.

The study's result shows that there were statistically significant differences between Nurses' practice at post-cardiac catheterization in age (p=0.009), level of education (p=0.000), Years' employment (p=0.031), and Years of Experience in care of Pediatric Cardiac Catheterization (p=0.002) because (p-value <0.05) This showed that nurses have good knowledge about post-cardiac catheterization complications. It was found that the significant value of P < 0.0001 by applying a correlation which showed there was a good association between practice and knowledge (P < 0.05).

CONCLUSIONS

The present study shows that most participants were male aged between(45-49). Years.The study demonstrated that nurse's knowledge in pediatric cardiac catheterization was satisfied, and more than half of them worked with "good practice." Further, the study's result indicates a significant positive statistical correlation between (nurse's knowledge and nurse's practice at Pre-cardiac, Intra-cardiac, Post-cardiac). The study recommends a specific training course for all the nurses working with children undergoing pediatric cardiac catheterization, and also further qualitative studies are also recommended.

ETHICAL CONSIDERATIONS COMPLIANCE WITH ETHICAL GUIDELINES

The study's protocol was accepted by the council of the College of Nursing and approved by the ethical committee of the College of the University / Medicine of Sulaimani. An official letter has been presented from the College of Nursing to the Sulaimani General Directorate of Health to obtain facilitation and cooperation; consequently, an agreement letter has been submitted from the Sulaimani General Directorate of Health Sulaimani Cardiac Hospital.

FUNDING

The researcher did not receive any grant from funding agencies in the public, non-profit sectors, or commercial for this research.

AUTHOR'S CONTRIBUTIONS

Study concept; Writing the original draft;Data collection; Data analysis and Reviewing the final edition by all authors.

DISCLOSURE STATEMENT: The authors report no conflict of interest.

ACKNOWLEDGEMENTS

We appreciate the anonymous referees for their helpful advice.

REFERENCES

Al-Ftlawy, D. (2014). Determination of nurses' knowledge toward care provided to patients with acute myocardial infarction in Al-Najaf City. kufa Journal for Nursing sciences, 2(2), 11-13.

Ali, N. S., Youssef, W., Mohamed, A., & Hussein, A. (2015). Nurses' knowledge and practice regarding implantable cardiac devices in Egypt. British Journal of Cardiac Nursing, 10(1), 34-40.

Alkaiyat, A., Abumadi, R., Atari, S., Sayeh, W., Al Zabadi, H., Sarawan, Z., ... & Shakhshir, N. (2019).Interventional cardiac catheterization predictors at Al-Arabi heart Center in Palestine in 2017. BMC cardiovascular disorders, 19(1), 1-5.

Aziz, S., & Lafi, S. (2011). Evaluation of Nurses' practices provided to the Patients who undergo Open Heart Surgery in Sulaimani center of Heart Diseases (SCHD). Kufa journal for nursing sciences, 3(1), 74-80.

Feroze, M., Afzal, M., Sarwar, H., Galani, A., & Afshan, S. (2017). Assess Knowledge and Practice of Registered Nurses about Patient Safety after Cardiac Catheterization in Punjab Institute of CardiologyHospital, Lahore. International Journal of Musculoskeletal Pain prevention, 2(2), 2-5.

Gaze, D. C. (Ed.). (2018). Congenital Heart Disease. BoD–Books on Demand.

Hasballah, S. M., Shaor, O. A. E., Mohamed, M. A., & Mohamed, A. K. (2019). Assess Nurses' Knowledge and Attitude for Patient Safety in Cardiac Catheterization Unit. Assiut Scientific Nursing Journal, 7(19), 151-159.

Keshk, L. I., & Elgazzar, S. E. (2018). Creating Learning Guideline for Nurses Caring for Patients Safety Undergoing Cardiac Catheterization. Research Journal of Education, 4(7), 101-109.

Mahmood, H. J., Ibrahim, R. H., Hassan, E. T., & Abdulgani, M. F. (2021). Assessment of Nurses' Knowledge of Patient Care After Cardiac Catheterization in Mosul Hospitals. Age, 20(24), 23.

Omer, Y. B. (2020). Quality of Pre Cardiac Catheterization Nursing Care at Surgical Specialty Hospital-Cardiac Center in Erbil City. Erbil Journal of Nursing and Midwifery, 3(1), 75-81.

Sameen, F. Y. (2018). Nurses' Knowledge Regarding Patients Safety After Diagnostic Cardiac Catheterization in Azadi Teaching Hospital in Kirkuk City. kirkuk university journal for scientific studies, 13(4).

Sharif, B. O., Salih, S. H., Sailh, N. A., & Salim, B. I. (2018). Nurses' Knowledge Regarding Cardiac Catheterization at General Hospital in Rania City. Kurdistan Journal of Applied Research, 183-187.

Thabet, O. F., Ghanem, H. M., Ahmed, A. A., & Abd-ElMouhsen, S. A. (2019). Assessment of Nurse's knowledge and practice for patients undergoing Cardiac Catheterization. Assiut Scientific Nursing Journal, 7(17), 95-101.

Yaqoob, A., Barolia, R., Noor, A., & Nazar, A. (2019). Knowledge and Practices among Nurses Regarding Patients' Care Following Cardiac Catheterization at a Tertiary Care Hospital in Karachi, Pakistan. Open Journal of Nursing, 9(8), 809-834.

Zaki, S. M. (2010). Evaluation of Nurses' Practices toward Children undergoing Cardiac Catheterization. Iraqi Scientific Nursing Journal, 23(2), 83-90.