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Evaluation of Practices about Pediatrics Cardiac Catheterization among Nurses at District Head Quarter Hospital

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ABSTRACT

Pediatric cardiac catheterization is a critical procedure that plays a vital role in diagnosing and treating congenital heart defects and other cardiac conditions in children. This procedure involves inserting a catheter into the heart chambers or vessels through a vein or artery. Nurses play multifaceted roles throughout the continuum of cardiac catheterization. **Objective:** To evaluate the practices of nurses about pediatrics cardiac catheterization. **Methods:** This study employed cross-sectional descriptive design at pediatric department of a District Head Quarter (DHQ) Hospital. Target population was registered nurses of age above 20 years and who had at least 6 months of practical experience with cardiac pediatric patients. Data were collected conveniently through observational checklist and analysis was done through SPSS Version 24.0. **Results:** Majority nurses were not encouraging bed rest to the pediatric patients nor keep affected extremity bend for 2-4 hours (80%) after catheterization. Moreover, they did not regularly check the vitals of the children and unable to monitor in every 15 minutes /hour or 30 minutes for next hour (81%). Nurses were unable to educate the pediatric parents for the removal of pressure dressing and nor assess the dressing site appropriately (92%). **Conclusions:** The present study findings suggested that majority nurses have poor practices before and after cardiac catheterization procedure while some have an average level of practices during the procedure. So, training programs should be arranged to enhance the practices of nurses about cardiac catheterization in pediatric population.

INTRODUCTION

Pediatric cardiac catheterization is a critical procedure that plays a pivotal role in diagnosing and treating congenital heart defects and other cardiac conditions in children. Cardiac catheterization in children is done for a number of reasons, such as monitoring, intervention, and diagnosis [1]. Cardiologists obtained comprehensive and complete information about the heart structure and functions in pediatric patients through cardiac catheterization procedure [2]. This procedure enables the health care team to diagnose congenital anomalies of heart, their severity and availability of treatment options for heart defects. Cardiac catheterization offers least invasive option to open heart surgery for complex cardiac anomalies in children leading to minimize child morbidity, mortality and reduce hospital stay [3]. Furthermore, Cardiac catheterization help in the diagnosis and management of different other disease in children namely, valvular disease, pulmonary hypertension and cardiac arrhythmias for better prognosis and enhancing the quality of life in pediatric population. Pediatric cardiac catheterization is comparable to adult cardiac catheterization. Despite apparent variations in adults, coronary atherosclerotic disease is much more frequent in children than in adults. Pediatric procedures involve distinct methods, treatments, and indications [4]. In the pediatric cardiac catheterization lab, a range of

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therapeutic procedures namely angioplasty and valvuloplasty for lesions causes stenosis, closure of vessels, removal of emboli, treatment of septal and pulmonary value defect were performed, The optimal level of sedation is determined by a thorough evaluation of the patient [5]. Pediatric cardiac catheterization patients require a skilled nurse who can identify potential issues and apply appropriate nursing care techniques to help them manage their condition and lessen any vascular consequences. Globally, developing nations bear a comparatively larger burden of cardiovascular disease. Nurses are the health care professionals who work to minimize the burden of cardiovascular morbidities and mortalities [6]. Nurses are the person who provide continuous care to the patient and closely monitor or start resuscitation if any complications noticed during delivery of care. Therefore, a skilled nurse with solid education and real-world experience is essential to any healthcare institution [7]. It has been determined that a nurse's post-coronary intervention care should resemble a "spider-in-the-web." Cardiovascular emergencies can be handled skillfully by a qualified nurse, who can also provide emergency medicine administration, early defibrillation, and rhythm detection [8]. This procedure is performed by expert team comprising of cardiologist, specialists of cardiac catheterization, competent nurse in a specially designed laboratory of cardiac catheterization. Child comfort and safety ensured by performing this extensive procedure under anesthesia. This procedure help the health care team members to assess the hemodynamic status of heart, visualize any abnormalities in the structure of heart, and help in the performance of various interventions with less invasiveness [9]. Health care team especially nurses reviewed the child previous medical history and the diagnostic test namely chest X-ray, ECG and echocardiogram etc., to assess the cardiac condition before the cardiac catheterization procedure in children. The consent form are required to be taken from the parents of the child and children are instructed to fast for a certain period before this procedure [10]. The child comfort and safety are ensured by performing this procedure under sedation. The dose of sedation and its type depend upon the child age, their heart status, and complexity of procedure [11]. A catheter is inserted into the heart chambers through artery or vein in cardiac catheterization for diagnosis and intervention purposes. Contrast may be given though this catheter to see the structures and vessels of heart. During this procedure of cardiac catheterization, the pulse pressure, oxygen saturation, heart rate and blood pressure of child are thoroughly assessed by the nurse [12]. It is not an entirely trouble-free procedure. Nonetheless, when a skilled crew completes it, it's safe. Small issues including irregular heartbeats, drug or dye reactions, bruises, transient soreness, small infections, and bleeding may occur. These complications are typically transient. More serious but unusual side effects include hematoma, severe bleeding, damage to blood vessels or nerves, stroke, irregular heartbeat leading to heart attack/ heart failure, blood clots lead to deep venous thrombosis in the legs, and emboli formation in lungs are also possible [13]. After the cardiac catheterization procedure, catheter is to be removed by expert person as well as pressure is applied on catheter insertion site to stop the bleeding. Children are monitored in the recovery room for potential complications of anesthesia and child may need to remain in hospital for monitoring and observation of after procedure complications [14]. Furthermore, parents are instructed to give post procedural care to the child in the form of restriction on physical activity and medicine [15].

Nurses play multifaceted roles throughout the continuum of pediatric cardiac catheterization. Therefore, this study evaluated the nurse's practices regarding cardiac catheterization in pediatrics.

METHODS

Descriptive cross-sectional study design was used to evaluate nurses' practices about pediatrics cardiac catheterization. The study was conducted in the pediatric department of the District Head Quarter Hospital. The target population was registered nurses having Valid PNMC Licensure. The duration of study was six month from August 2023 to January 2024. The study participants were recruited by convenient sampling technique. Sample size for this study was 80 which calculated through Slovin's formula [16]. The inclusion criteria were all pediatric department nurses having age above 20 years, male and female who had at least 6 months of practical experience with cardiac pediatric patients. However, nurses who were not registered with council and having no experience with cardiac patients excluded. Data were collected through a checklist about the practices of nurses regarding the care of patients with cardiac catheterization. This checklist was consisted on three parts namely Pre- cardiac catheterization, Intra-cardiac catheterization, and Post cardiac catheterization practices of nurses. The nurse's practices score less than 75% was marked as poor and equal or greater than 75% as good. Ethical permission was taken from the Principal, College of Nursing Letter No. RP/PCON/23/110 dated December 28, 2023. Consent was taken from the participants of the study. The subjects have the right to refuse and withdraw from the study. The analysis of data was done through SPSS Version-24 and results were presented in the form of frequencies tables.

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RESULTS

The present study results depicted that 80 participants working in the pediatric unit was recruited for data collection. Result section was divided into two parts. The first part showed the demographics study participants. While the second part evaluated the practices of nurses about cardiac catheterization.

Table 1 described the demographic characteristics of study subjects including age, marital status, education and years of experience. The age brackets of the participants' as 27-32 Years, 33-38 Years, and 39-44 Years having 29%, 50% and 6 % nurses respectively. Majority nurses were married 63 (79.0%). Moreover, from educational aspect majority were degree holder nurses Generic BSN 22 (27.0%), 2 Year BSN (Post-RN) 33 (42.0%) and 25 (31.0%) have done Diploma Nursing. Upon asking about the year of experience, 36% nurses have experience above 6 month to 5 years while other nurses have experience between 06 years- 10 years.

Table 1: Demographics of Study Participants (n=80)

Sr. No.	Demographic Characteristics	Frequency (%)
1	**Age of Participants**	
	21-26 Years	9 (11%)
	27-32 Years	23 (29%)
	33-38 Years	40 (50%)
	39-44 Years	5 (6%)
	45-51 Years	3 (4%)
2	**Marital Status of Participants**	
	Married	63 (79%)
	Unmarried	17 (21%)
3	**Education of Participants**	
	Diploma in General Nursing	25 (31%)
	4 Year BSN (Generic)	22 (27%)
	2 Year BSN (Post-RN)	33 (42%)
4	**Experience**	
	06 Months-05 Years	29 (36%)
	06 Years-10 Years	51 (64%)

Results in table 2 indicated that most of the nurses were not caring the pediatric patients in pre-cardiac catheterization period as responses indicated that nurses did not assess the understanding of parents and their child about the catheterization procedure (90%), not ensured that consent paperwork is accurately completed (74%). Moreover, nurses did not monitor or document the vital signs (68%) and unable to check the previous diagnostic report namely Echo cardiogram (75%) of the patients. However, the data about the practices of nurses during the cardiac catheterization revealed that majority nurses performed well during this period. Majority nurses were practice appropriately to sterilize the puncture site (76%), flush all the line to remove the air (88%), assists the doctor properly during the catheterization procedure, (92%), and majority were applied pressure dressing over the puncture site (88%). While the respondents data after the cardiac catheterization indicated poor practice as majority nurses were not encourage bed rest to the pediatric patients after cardiac catheterization nor keep affected extremity bend for 2-4 hours (80%). Nurses did not regularly check the vital signs and unable to monitor it every 15 minutes /1 hour or every 30 minutes for next hour and then hourly (81%). Furthermore, they did not assess the affected extremity with reference to color, alteration in temperature, and checking of capillary refill (78%). Nurses were unable to educate the pediatric parents for the removal of pressure dressing after 24 hours and not to assess the dressing site appropriately (92%). Majority nurses were not assessing the extremity pulses distal to the catheter insertion in the post-cardiac catheterization period (86%).

Table 2: Scores of Pediatric Cardiac Catheterization Practices among Nurses

Sr. No.	Items	Done F (%)	Not Done F (%)
A	**Pre- Cardiac Catheterization Practices**		
1	Catheterization procedure understanding	8 (10%)	72 (90%)
2	Children not eat/drink.	74 (92%)	6 (8%)
3	Checking the cannula of child.	73 (91%)	7 (09%)
4	Ensure consent paperwork is accurately completed.	21 (26%)	59 (74%)
5	Check documents of lab. Test.	64 (80%)	16 (20%)
6	Vital signs to be monitored/documented.	34 (42%)	56 (68%)
7	Check report of previous echo cardiogram.	20 (25%)	60 (75%)
8	Check patient name and date of birth.	38 (48%)	42 (52%)
9	Chart and update the documents of whole procedure.	61 (76%)	19 (24%)
B	**Intra- Cardiac Catheterization Practices**		
1	Discussion of the procedure with doctor.	10 (13%)	70 (87%)
2	Preparation of equipment/ supplements for procedure.	26 (32%)	54 (68%)
3	Washing of hands before procedure.	14 (17%)	66 (83%)
4	Checking the operating room temperature.	7 (09%)	73 (91%)
5	Sterilizing the puncture site by nurse.	61 (76%)	19 (24%)
6	Connecting the child with cardiac monitor.	50 (62%)	30 (38%)
7	Sterile towel used to cover the child.	62 (78%)	18 (22%)
8	Nurse starts flushing all the line to remove the air.	70 (88%)	10 (12%)
9	Assisting the physician during cardiac catheterization procedure by nurse.	74 (92%)	6 (08%)
10	Putting pressure or observing puncture site for any bleeding or hematoma.	58 (72%)	22 (28%)
11	Application of dressing on the site of puncture by nurse.	70 (88%)	10 (12%)
12	Transferring child to the ward and handed over to other nurse for care /monitoring.	78 (98%)	2 (02%)
C	**Post-Cardiac Catheterization Practices**		
1	Nurses should make sure the availability of equipments before the patient returns to ward.	12 (15%)	68 (85%)
2	Provide information to parents to hold children on bed for optimal level of rest.	20 (25%)	60 (75%)

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3	Keeping the affected extremity straight/ slight bend and encourage the parents for child bed rest.	16 (20%)	64 (80%)
4	Give medication i.e., pain killer or antibiotic.	73 (91%)	7 (09%)
5	Assess dressing site for bleeding or hematoma.	61 (76%)	19 (24%)
6	Monitor vitals 15 or 30 minutes before next hour, then hourly.	15 (19%)	65 (81%)
7	Assess the temperature/color/ capillary refill of extremity.	18 (22%)	62 (78%)
8	Provide warmth for the patient.	26 (32%)	54 (68%)
9	Start the fluid and soft diet to child after awaking.	74 (92%)	6 (08%)
10	Instruct the parents to go together with the child after awaking postoperatively.	62 (78%)	18 (22%)
11	Instruct the parents to report any sign of bleeding immediately.	56 (70%)	24 (30%)
12	Educate the parents about removal of pressure dressing and site assessment	6 (08%)	74 (92%)
13	Assess the extremity pulses distal to catheter insertion.	11 (14%)	69 (86%)

DISCUSSION

The present study was evaluated the nurse's practices regarding cardiac catheterization in pediatrics. The current study results revealed that majority participants were between the age of 33-38 years and from educational aspect most of them were degree holder nurses while (31%) nurses did Diploma in General Nursing. The previous study's findings are consistent with the present result and showed that the sample's mean age was 34.26 years, and they had graduated from an institute of nursing [17]. Nursing care is one of the most significant aspects in minimizing cardiac catheterization complications reported by patients. According to the finding of present study majority nurses were not caring the pediatric patients in before the procedure of cardiac catheterization. Nurses were not practice competitively in the pre- cardiac catheterization period. Participants' responses indicated that they did not assess the understanding of parents and their child about the catheterization procedure (90%), not ensured that consent paperwork is accurately completed (74%). Moreover, nurses did not monitor or document the vital signs (68%) and unable to check the previous diagnostic report namely Echo Cardiogram (75%) of the patients. While the findings of several other studies are not consistent with the present findings as the medical history of the child is thoroughly evaluated by nurses. In order to ensure that the child and their family are prepared, the operation must be explained to them in language that is appropriate for their age [18, 19]. Furthermore majority nurses give pre-procedural medicine, such as sedatives or anxiolytics, to the child in order to help them unwind and feel less anxious before the treatment. Most of the nurses establish baseline values and continuously monitor vital signs such as heart rate, blood pressure, respiration rate, and oxygen saturation during the pre-catheterization phase [20]. A pre-procedural checklist can help guarantee that, prior to bringing the child to the cardiac catheterization laboratory; all necessary procedures are carried out by the nurses [21]. However, the current study results depicted nurses' average level of practices during the cardiac catheterization period. The data about the practices of nurses during the cardiac catheterization revealed that majority nurses performed well during this period. Majority nurses were practice appropriately to sterilize the puncture site (76%), flush all the line to remove the air (88%), assists the doctor properly during the catheterization procedure, (92%), and majority were applied pressure dressing over the puncture site (88%). These findings are similar to the previous study where nurses assist the cardiologist during the catheterization procedure by providing necessary equipment and they help with positioning the child and ensuring sterile technique is maintained throughout the procedure [22-24]. While the respondents data after the cardiac catheterization indicated poor practice as majority nurses were not encourage bed rest to the pediatric patients after cardiac catheterization nor keep affected extremity bend for 2-4 hours (80%). Nurses did not regularly check the vital signs and unable to monitor it every 15 or 30 minutes for next hour and afterward hourly (81%). Furthermore, they did not assess the affected extremity with reference to color, alteration in temperature, and checking of capillary refill (78%). Nurses were unable to educate the pediatric parents for the removal of pressure dressing after 24 hours and not to assess the dressing site appropriately (92%). Majority nurses were not assessing the extremity pulses distal to the catheter insertion in the post-cardiac catheterization period (86%). While these findings are antagonist to previous study results as Nurses monitor the insertion sites where catheters are placed, ensuring they remain clean, dry, and free from infection [25]. Moreover, nurses assess for any signs of bleeding, hematoma formation, or other complications at the insertion site. Nurses closely monitor the child's recovery from anesthesia and assess for any signs of complications such as bleeding, pain, or allergic reactions. They provide post-procedure instructions to the family, including guidelines for wound care and when to seek medical attention if needed [26]. Nurses offer emotional support to both the child and the family throughout the procedure and afterward. They provide education to the family about the procedure, expected outcomes, and follow-up care requirement [27]. Nurses maintain accurate and thorough documentation of the procedure, including vital signs, medications administered, and any complications or unexpected events that occur after the procedure [28]. Nurses play a vital role in the care of pediatric patients undergoing cardiac catheterization, ensuring their safety, comfort, and well-being throughout the procedure and during the recovery period.

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CONCLUSIONS

Present study findings suggested that majority nurses had poor practices before and after cardiac catheterization procedure in pediatric patients. The respondent's data after the cardiac catheterization procedure indicated poor practice as majority were neither encourage bed rest to the pediatric patients nor to keep affected extremity bend for 2-4 hours (80%). Nurses did not regularly check the vital signs and were unable to monitor in every 15 minutes /hour or 30 minutes for next hour (81%). Furthermore, they did not assess the affected extremity with reference to color, alteration in temperature, and checking of capillary refill (78%). Nurses were unable to educate the pediatric parents for the removal of pressure dressing after 24 hours and to assess the dressing site appropriately (92%). However, the study's results indicated that nurses had average level of practices during the cardiac catheterization period.

Authors Contribution

Conceptualization: SP[1]
Methodology: SP[1], MB, SA
Formal analysis: SA
Writing-review and editing: SP[1], SP[2], SU

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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