

Effect of Peplau Theory Model Application on Nurses' Performance Regarding Care of Children Post Open Heart Surgery

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Abstract

Background: Open-heart surgery differs from other types of surgery its need for highly skilled and talented personnel including physician and nurses as well, for this reason it is important for nurses to become familiar with the cardiac surgery. **Aim of the study:** This study aimed to evaluate the effect of Peplau theory model application on nurses' performance regarding care of children post open heart surgery. **Design:** A quasi- experimental design. **Setting:** The present study was carried out in cardiothoracic surgery department and cardiac care unit in the National Heart Institute in Embaba. **Subjects:** A convenience sampling of all available nurses working with children post open heart surgery (40) in previously mentioned setting and purposive sample of children (40) undergoing to post open heart surgery. **Tools of data collection:** Two tools of data collection were used; **Tool I:** A structured interview questionnaire sheet: to assess personal characteristic of nurses, personal characteristics of studied children and medical data, and assess nurses' knowledge post open-heart surgery and peplau theory. **Tool II:** Observation checklist to assess nurses' practice regarding post open heart surgery and discharge planning care. **Results:** There was a positive correlation between total knowledge, total practices and total planning discharge care after application of Peplau theory model regarding post open heart surgery for children. **Conclusion:** Based on the result of the present study The level of nurses' knowledge and practice regarding care of children post open heart surgery was improved after application of Peplau theory model. **Recommendations:** Implementation application of Peplau theory for nurses about care of children post open heart surgery continuously and availability printed booklets and handouts about care of children with light of peplau theory model application to help given health education for children and care givers.

Keywords: Peplau Theory, Care of Children, Nurses' Performance, Post Open Heart Surgery.

Introduction

Heart diseases is the second leading cause of death in children, result from abnormal cardiovascular development during fetal life, and the highest mortality occur during the neonatal period until 20 years of life. Many different types of heart disease can affect children. They include congenital heart defects, viral infections that affect the heart, and even heart disease acquired later in childhood due to illnesses or genetic syndromes (Pierpont et al., 2018). However,

several factors are associated with a higher incidence of the heart disease; they include genetic and environmental factors. Genetic factors account for about 8% of congenital heart disease (Garcia & Peddy, 2018). Open heart surgery is performed when the probability of survival with a useful life is greater with surgical treatment than with non-surgical treatment. Open heart surgery is absolutely essential for the treatment of many types of congenital heart defects such as repair of atrial septal defect, ventricular defect,

transposition of the great arteries and tetralogy of fallout (**Tankeu & Bigna, 2017**).

Open heart surgery is performed in which the heart muscle is incised, and the internal heart structures are directly visualized. It's performed on the heart while the blood stream is diverted through a heart - lung machine. Open-heart surgery differs from other types of surgery in its need for highly skilled and talented personnel including physician and nurses as well, for this reason it is important for nurse to become familiar with the cardiac surgery (**Harky & Asim, 2019**).

Peplau was a pioneer theorist who introduced the middle rang theory of interpersonal relations to promote health care of children, the power of interaction in nursing care used as a backbone in emphasizing the nurse-children relationship. Moreover, the nurse and child work together to become more knowledgeable in the care process (**George & Julia., 2016**). The aim of Peplau theory is to maintain interpersonal relationship between pediatric nurses and children as well as improve use of evidence-based nursing in hospital. The nurse and child work together to become more knowledgeable in the care process. **American Journal of Nursing Research, (2017)**

The relationship between nurses and children lies at the heart of nursing practice, this common goal provides the incentive for the therapeutic process in which the nurse and children respect each other as individuals. Moreover, after application of Peplau theory it is important to assess the nurses' knowledge, skills and adaptive behaviors in dealing with children after open heart surgery. **Senn., 2019**)

Peplaus' theory includes four phases of therapeutic nurse and children relationship which can be applied in interaction with children post open heart surgery. **Orientation phase:** this phase is directed by nurse and involves engaging the child in treatment. The

nurse helps child to recognize and understand their condition and the importance of intervention and treatment. **Identification phase:** the nurse and child work interdependently express feeling **Exploitation phase:** the child makes full use of services offered. **Resolution phase:** the child no longer need professional services and need to terminate their therapeutics relationship and dissolve the links between (**D'antiop et al., 2014**).

Nursing role regarding care of children undergoing of post open heart surgery for children include taking accurate vital signs , careful record all IV fluid administered to the child post open heart surgery, monitoring of the Laboratory test such as arterial blood gases ,hemoglobin, clotting time, electrolytes, maintain patent airway, assess temperature of extremities, assess for symptom of hypoxia, preventing infection, promoting nutrition, allowing maximum rest, planning for progressive activities post open surgery , giving emotional support , observe all surgical dressing and, observation of the amount of chest tube drainage, observing for complication of surgery (**Ramesh et al., 2016**). The nurse has a responsibility to educate parent and provide care of children post open heart surgery. Also, the nurse helps the child post open-heart surgery to assume maximum responsibly for meeting treatment goals in a mutually satisfying way (**Wong et al., 2018**).

Significance of the study:

Open heart surgery is considered a major surgical operation of children. Also is absolute essential for the treatment of many type of heart defect in children. The congenital heart diseases is the commonest single group of congenital abnormalities accounting about 30% of total abnormalities in the United States and presenting in 8 to 10 per 1000 live birth in European population, while in Egypt, the incidence of congenital heart disease among

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Egyptian children has been estimated to be 5-6 per 1000 live births (**Nazarip et al., 2020**).

Complication post open heart surgery of children including bleeding, stroke, pneumonia, heart attack, infection. So, the application of Peplau theory model to improve nurses' knowledge and practice regarding care of children post open heart surgery and interpersonal process of the therapeutic interaction between nurses and children and prevention of these complication (**William & Asquith., 2018**) So that, the researcher found urgent to conduct the current study to assess the effect of Peplaus' theory model application on nurses' performance regarding care of children post open heart surgery.

Aim of the study

The aim of the study was to evaluate the effect of Peplau s 'theory model application on nurses' performance regarding care of children post open heart surgery.

Research hypothesis

The level of nurses' knowledge and practice regarding care of children post open heart surgery improved after application of Peplau theory model.

Subjects and method:

Research design: -

A Quasi- experimental design was utilized to conduct this study.

Research Settings:

The study was conducted at cardiothoracic surgery department and cardiac care unit in the National Heart Institute in Embaba, affiliated to Egyptian Ministry of Health and Population which located in the second floor, and consists of (2) rooms with bed capacity (12) beds, 6 beds in the room each.

Research Subjects:

- A convenient sample including 40 of nurses working with children post open heart surgery in previously mentioned settings.

- A purposive sample of hospitalized male and female children going post open heart surgery under the following inclusion criteria:

- 1-Age from 8-18 years
- 2- Free from any other medical condition

Tools of data collection

Data collection was obtained by using the following tools:

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Data collection was obtained by using the following tools:

Tool (I): A structured interview questionnaire sheet:

It was developed by researcher after reviewing the related literatures and consists of the four parts.

Part (1): Personal characteristic of studied nurses such as age, gender, qualifications, occupation, working unit, years of experience at cardiac care unit and previous training courses about post open heart surgery.

Part (2): Personal characteristics of studied children such as age, gender, ranking, date of disease discovery and **medical history** such as medical diagnosis, signs and symptom of congenital heart disease, vital signs, importance of follow up, dangerous signs, laboratory investigation, and importance of giving drug after discharge care.

Part (3): Nurses knowledge, include:

A: Nurses' knowledge about anatomy of heart and congenital heart disease (Harky and Asim, 2019) & (Garcia and peddy 2018) it included (11) questions in the knowledge anatomy of heart and congenital heart disease closed ended questions.

B: Nurses' knowledge about open heart and post open-heart surgery. It included (39) questions in the nurses knowledge about of open heart and post heart surgery.

C: Nurses knowledge about bacterial infection pre and post application of peplau theory model

D: Knowledge about Peplau theory: Consists of four phases include: **Orientation:** as: defining problem and deciding type of service needed Identification: as: identified needs of children post open heart surgery **Exploitation:** as, use of professional assistance for problem solving alternatives, **and Resolution:** as, effect of collaboration of child's and nurse and termination of professional relationship.

The scoring system of nurses' knowledge:

- Correct and complete answer scored (2)
- Correct and incomplete answer scored (1)
- Incorrect answer or don't know scored (0)

The total scoring system of nurses' knowledge will be classified into three levels as the following:

- 85-100% considered satisfactory.
 - < 85% considered unsatisfactory knowledge
- Nurse's answers will compared with model key answer and if nurse answer question correctly to considered satisfactory practice

Tool (II): Nurses' performance by using observational checklists, it will adapted from (Wilson& Hockey., 2007) used to assess actual nursing practice regarding care of children post open heart surgery.

The scoring system for nurses' practice will be as the following:

- Done correctly will score (1)
- Not done will score (0)

Scoring system for nurses reporting practice will be calculated as the following:

- > 85% considered competent.
- < 85% e considered incompetent.

Validity and reliability:

The study tools were revised by a panel of three experts in the field of Pediatric Nursing to determine the extent to which the items in the tools were related to each other. The opinion of the judges was to rephrase some sentences again, adding some points, as vital signs and the classification of the medical diagnosis into cyanotic congenital heart disease and non-cyanotic congenital heart disease. It

has been reformulated; the required part has been added. Reliability of proposed the tools was done by using the research cronbachs alpha test.

- Total knowledge reliability statistical cronbach alpha = 1
- Total practice reliability statistical cronbach alpha = .566
- Total follow up reliability statistical cronbach alpha = .632

Ethical and legal considerations:

Ethical aspect was considered before starting the study that including no harm for subject, maintain confidentially and privacy was take into consideration regarding data collection, and having the right to withdraw from the participation at any time They secured that, all the gathered data was confidential and used for research purpose.

Pilot study:

It was carried out on 10% of the sample size of nurses and children (4) to evaluate the reliability and applicability of the tools and estimate the proper time required for answering the questionnaire. The results of data obtained from the pilot study helped in modifications of study tools where items were corrected, modification omitted and added as necessary. All the nurses involved in pilot study were excluded from the study sample.

Field work:

The actual field work was carried out over 6 month of collecting tools from the first week of July (2022) up to the end of December (2022). The researcher was available in the study setting three days/ weekly at morning shift (two days cardiac care unit & one day in cardiothoracic department. Also will assess the nurses' knowledge and practice regarding care for children post open heart surgery.

Administrative design:

Been approved on data collection and for implementation of the educational program in National Heart Institute in Embaba

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cardiothoracic department and cardiac care unit were obtained from the hospital administrative personnel. This was done by the submission of a formal letter from the dean of the faculty of nursing.

Statistical analysis:

Data collected from the studied sample was revised, coded and entered using computer. Data entry and statistical analysis were fulfilled using the statistical package for social sciences (SPSS). Data were presented using descriptive statistics in the form of number, percentage, mean, standard deviation, T test & P-value, Pearson correlation.

Significance of the results

- Non-significant (NS) $P > 0.05$
- Significant (S) $P < 0.05$
- Highly significant $P < 0.001$

Results:

Table (1): Shows that half (50%) of nurses aged regarding between $25 \leq 30$ years, while less than a quarter (20%) of nurses were aged less than 25 years. Qualification, it is found that above two third (60%) of them had technical nursing diploma, while the bachelor's degree in nursing were one tenth. Regarding occupation this table illustrated that the majority of studied nurses were one tenth of staff nurses and of them were head nurse. Regarding years of experience in CCU half (50%) of nurses had $5 \leq 10$ years of experience.

Table (2): Shows that half (50%) of studied children are between $10 \leq 14$ years with mean age 11.00 ± 2.60 . As regard their child ranking, it was found that less than half (40%) of them were the first child and less than one third (30%) fourth or more. Regarding the disease discovered less than three quarter (70%) of children discovered immediately after birth, while less than one third (30%) of them were appearance of symptoms.

planning discharge of Peplau theory ($r = .895$) and post application planning discharge of Peplau theory model ($r = .632$).

Table (3): Portrays the most common diagnosis congenital heart disease occurs in the studied children. It was found that the highest percentage of studied children having ventricular septal defect and atrial septal defect (37.5% and 27.5% respectively). All children most common manifestations were cyanosis and dyspnea (50% and 25%) respectively and one third of them had arrhythmia. Regarding important give medication, it was found of nurses studied of important of medication were half (50%) were promotion of health condition, while quarter (25%) were avoid complication and healing of wound. Regarding important medical the follow up of children (60%) had two third follow up condition continuously, while less than quarter (10%) was early detection of complication and change treatment system.

Figure (1): Indicates that only 22.5% of studied nursing had satisfactory level of knowledge about preparation child for surgery pre application of Peplau theory, while this level of nurse's knowledge increased to reach 82.5% after implementation of the application of Peplau theory.

Figure (2): Indicates that of studied nurses regarding their total practices level through the application Peplau theory model were more than half (52.5%) competent of immediately post of application, while majority (82.5%) were competent of first day of application Peplau theory model.

Table (4) the correlation between total knowledge and practice scores throughout application of Peplau theory model. It points to positive correlation at pre application model of Peplau theory ($r = .864$) and post application model of Peplau theory ($r = .599$).

Table (1): Number and percentage distribution of studied nurses regarding their personal characteristics (n=40).

personal characteristics of nurses	Number (40)	Percentage %
Age		
<25	8	20.0
25-<30	20	50.0
30+	12	30.0
Mean \pmSD 27.70\pm5.51		
Qualification		
Nursing diploma	12	30.0
Technical nursing diploma	24	60.0
Bachelor of nursing science	4	10.0
Occupation		
Staff nurse	36	90.0
Head nurse	4	10.0
Nursing supervisor	0	0.0
Working unit		
Cardiothoracic department	10	25.0
Cardio care unit	30	57.0
Years of experience		
Less than one year	8	20.0
1 \leq 5 years	12	30.0
5- \leq 10 years	20	50.0
More than 10 year	0	0.0

Table (2): Number and percentage distribution of studied children regarding their personal characteristics (n=40)

Children characteristics	Number (40)	Percentage %
Age		
8 <10	16	40.0
10-<14	20	50.0
14 \leq 18	4	10.0
Mean \pmSD 11.00\pm2.60		
Gender		
Male	20	50.0
Female	20	50.0
Ranking		
First	16	40.0
Second	4	10.0
Third	8	20.0
Fourth or more	12	30.0
Disease discovered onset of disease		
Immediately after birth	28	70
appearance of symptom	12	30
Don't know	0	0.0

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Table (3): Number and percentage distribution of studied child regarding their medical history (n=40).

Studied children regarding their medical history	Number	Percentage
Diagnosis		
cyanotic congenital heart disease:-		
Tetralogy of fallout	8	20.0
Transposition of great arteries	4	10.0
Non cyanotic congenital heart diseases		
Ventricular septal defect	15	37.5.
Pulmonary stenosis	3	5.0
Patent duct arterious stenosis	0.0	0.0
Atrial septal defect	12	27.5
Aortic valve regurgitation	0.0	00.0
Manifestation		
Cyanosis	20	50.0
Dyspnea	10.0	25.0
Feeling tired during exercise	5	12.5
Sweating when crying and eating	0	00.0
Arrhythmia	5	12.5
Important medical follow up		
Follow up condition continuously	24	60.0
Change treatment system	4	10.0
Monitoring and observation of the wound	8	20.0
Early detection of complication	4	10.0
Importance of medication		
Avoid complication and reduce	10	25%.
Healing of wound	10	25%.
Promotion of health condition	20	50%

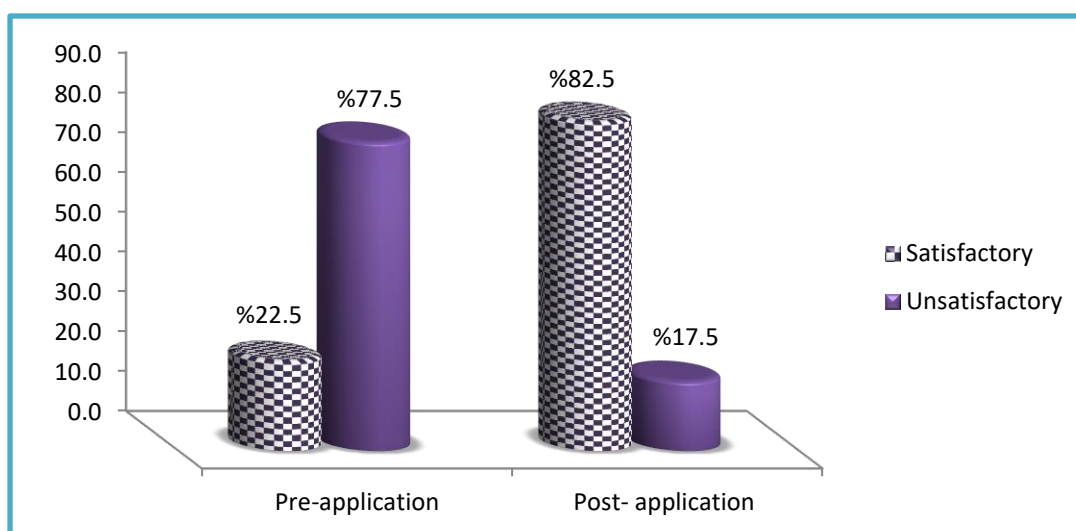


Figure (1): Number and percentage distribution of studied nurses regarding their total knowledge level pre and post application Peplau theory (n=40)

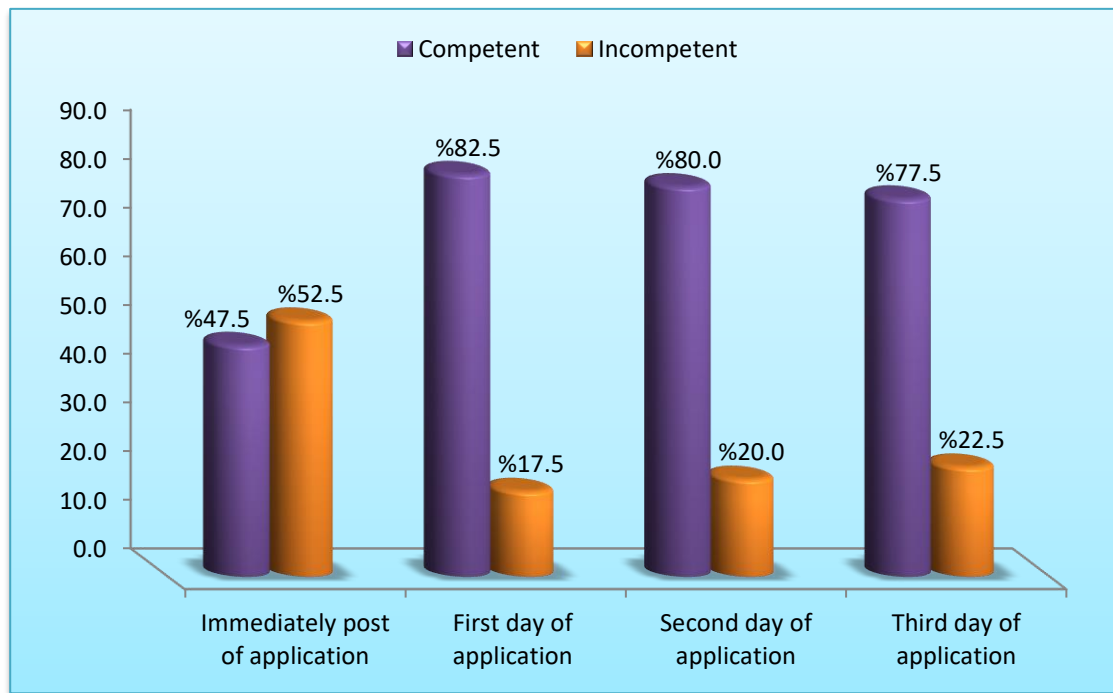


Figure (2): percentage distribution of studied nurses regarding their total practices level through the application Peplau theory model (n=40).

Table (4): correlation between total knowledge, total practices and total Planning discharge practices pre and post application Peplaus' theory n=40

Items		Pre			Post		
		Total knowledge	Total practices	Planning discharge	Total knowledge	Total practices	Planning discharge
Total knowledge	R	1	.864	.895	1	.599	.632
	p-value		.000**	.000**		.000**	.000**
	N	40	40	40	40	40	40
Total practices	R	.864	1	.884	.599	1	.944
	p-value	.000**		.000**	.000**		.000**
	N	40	40	40	40	40	40
Total planning discharge	R	.895	.884	1	.632	.944	1
	p-value	.000**	.000**		.000**	.000**	
	N	40	40	40	40	40	40

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Discussion

Peplau's theory is considered the most famous theory explaining the interaction process between nurses and children. Nurses engaging in pediatric care shoulder the expectation of the whole family of a sick child. The present study documents highly significant effects of the application of Peplau theory model on child health. Application of Peplau theory is very important care of children regarding post open heart surgery (**Texas Heart Institute, (2017)**).

Cardiac surgery requires postoperative precaution to avoid complication. Incision care is needed to avoid infection and minimize scarring. Swelling and loss of appetite is common. Recovery from open-heart surgery begins with about heart rate, blood pressure, and oxygen level are closely monitored. Chest tubes are inserted to drain blood around the heart and lungs. After discharge from the hospital, compression socks may be recommended in order to regulate blood flow (**Medtronic, 2017**).

This study was done to assess nurses' knowledge and practice related to nursing care of post open heart surgery of children. This study composed of 40 nurses who worked with open heart children. Nurses' knowledge was assessed by using questionnaire sheet and nurse's performance was assessed by using observation check list. It was found that less than half of nurses, for this reason the application of Peplau theory was in simple Arabic language, and supported by pictures and models for practice parts guided by different teaching methods to suit their level of understanding.

As regards the characteristics of the studied nurses, this finding clarified that, near to half of them aged 25-30 years, with mean age (27.70 ± 5.51). This result dis-

agreed with **Nissan, (2016)** who stated that, more than half of the nurses were married; three fifths had less than five years of experience and most of them didn't attend any training courses. The result of the present study of nurses about years' experience age $5 \leq 10$ years, show that near half percentage, this result disagreed with **Atallah (2017)**, who found that the majority of nurses had experience more than 5 years.

The result of the present study of nurses, showed that, two third of studied nurses were graduated from technical nursing diploma institute. This finding was disagreed with **Ahmed et al., (2017)** who found that near half of the studied nurses were highly educated bachelors, having a university degree or more. Job of nurses, it was found that about majority of them were staff nurses, less than quarter of them were head nurse. This finding agreed **Mitra et al (2017)** who found that majority of studied sample of staff nurse.

As regards for the characteristics of the studied children, this finding clarified that, half of the total number of cases among the study sample, the mean age 11.00 ± 2.60 . This finding in disagreement with **Hassan, 2015)** who found in this study that children with CHD are predominantly male more ever specific defect may show definite gender preponderance. This could be due to tradition of children families were from rural area who prefer to male sex than females sex.

As regards child ranked, the highest percentage of the study studied children were either first(40%) and fourth and more in their ranked (30%) this finding agrees with **Al-kherbash., (2017)** who found that most of studied cases with congenital heart disease were first or fourth and more. Moreover, and in congruence with the present study result, **Lemone and Barke (2021)**, found that risk

of chronic disease increased among children who ranked fourth or more. This could be attributed to advanced maternal age, malnutrition disease, large family size and High crowding index.

Concerning to type of congenital heart disease, the most common type in the present study was ventricular septal defect more than third and flowed by atrial septal defect. This finding of the present study degree with that of **Omer, (2017)** who reported that among the attended child with congenital heart disease at pediatric cardiology clinic of king Fahd specialist Hospital in the duration ventricular septal defect was the commonest lesion more than third , was flowed by atrial septal defect

As regards the diagnosis of the studied children, the finding of the present study indicates one third of them were diagnosed cyanotic congenital heart disease, while more than three quarter of them were diagnosed non cyanotic congenital heart disease. This finding supported with **Demirpence et al., (2018)** who studied" complications and congenital cardiac disease in infant of mother with pre gestational and gestational diabetes" found that near quarter incidence of congenital heart disease was in infants of diabetic mother. This finding might be related to insulin effect in controlling metabolic disorder and might be there is no relation between diabetes mellitus and congenital heart disease.

As regards the most common manifestation of the studied children with congenital heart disease, the finding of the present study indicates that near half of them dyspnea, while less than third of them cyanosis. On the other hand, **(Anthony C and Chang, (2018)** reported that dyspnea was the main symptom among children with congenital heart disease accounting for 72%of the cases.

The result of the present study revealed that nurses of the studied nurse discovered

congenital heart disease their infant about less than three quarters of immediately after birth, while one third appearance of symptoms table (this finding dis agreed with **Ahmed et al, (2017)** who mentioned that around half of studied mother discovered congenital heart disease among their infant during neonatal period, In addition **Mohamed et al., (2017)** who studied qualities of life among mother have infant with congenital heart defect found more than on Quarter detected the CHD From symptom.

The result of the present study revealed that nurse's total knowledge of peplau theory through application of Peplau theory model phases, it show that nurses had total knowledge pre application of Peplau theory model were minority satisfactory identify define, phases, advantage, nurse occupations application of Peplau theory, while had total knowledge post program were majority were satisfactory identify define, phases, advantage, nurse occupations application of Peplau theory. Nurse's knowledge about peplau theory was un satisfaction of pre application of Peplau theory. They don't know anything about the meaning of theory and application, while after conducting the application of Peplau theory model, their knowledge was satisfaction because they learned the meaning of theory and application.

The result of the present study revealed that nurse's their total practices through the application model of Peplau of post open heart surgery were competent or Aquent. This finding agreement with **Mental Health America (2017)**, effect of preoperative instruction on the post-operative outcome for children undergoing heart surgery. Practice were competent because technical institute nursing have a lot of practical experience of diploma and bachelors, because they are constantly applied practice, and they take

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more than six months to train them, this increase their practical experience.

The result of the present study revealed that nurse's correlation between total knowledge and practice scores throughout application model of Peplau theory in table 8. It points to positive correlation at pre application model of Peplau theory ($r = .864$) and post application model of Peplau theory $r = .599$) phases. At the planning discharge phase, the correlation was statistically significant positive, at pre ($r = .895$) and post this result not agreement with study about evaluation of nurses practices provided to the patient who undergo open heart surgery done in Egypt by Aziz, (2019), who found that there was significant statistical correlation between total knowledge score and total practice score.

Conclusion:

The level of nurses' knowledge and practice regarding care of children post open heart surgery were improved after application of Peplau theory model and there was positive correlation between knowledge and practice.

Recommendation:

- Implementation application of Peplaus' theory for nurses about care of children post open heart surgery continuously
- Availability printed booklets and handouts about care of children with light of Peplaus' theory model application to help given health education for children and care givers.

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تأثير تطبيق نموذج نظرية بيبلاو على أداء الممرضات تجاة رعاية الاطفال بعد جراحة القلب المفتوح

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جراحة القلب المفتوح من أخطر العمليات للأطفال. علاوة على ذلك انها ضرورية لعلاج الكثير من العيوب الخلقية. التي تشكل حوالى ٣٠٪ من كل العيوب الموجودة الولايات المتحدة حيث تحدث من ٨ الى ١٠ لكل مائة طفل فى اوروبا. بينما معدل حدوث العيوب الخلقية بين الاطفال المصريين تحدث من ٥ الى ٦ من كل مائة طفل فى مصر. وكان الهدف من الدراسة هو تقييم تأثير تطبيق نموذج نظرية بيبلاو لأطفال بعد جراحة القلب المفتوح ويعتبر الهدف الاساسى من الدراسة هو تقييم مستوى معلومات وممارسات الممرضات تجاة رعاية الأطفال بعد جراحة القلب المفتوح وتصميم وتنفيذ نظرية بيبلاو للممرضات لتحسين الرعاية التمريضية لأطفال بعد جراحة القلب المفتوح وقد اجريت هذه الدراسة فى وحدة رعاية القلب وقسم القلب والصدر بالمعهد القومى بامبابة التابع لوزارة الصحة والسكان المصرية. واشتملت عينة البحث على كل الممرضات القائمت على رعاية الأطفال بعد جراحة القلب المفتوح . وخلصت الدراسة الي إن معلومات وممارسات الممرضات عن رعاية الأطفال بعد جراحة القلب المفتوح كانت غير مرضية وغير كافية , وبعد تطبيق نظرية بيبلاو تم تحسين المعلومات والممارسات بصورة ملحوظة .