

EFFECT OF ATRAUMATIC CARE PROGRAM ON NURSES' PERFORMANCE FOR CHILDREN UNDERGOING CARDIAC SURGERIES

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Abstract

Atraumatic care refers to all therapeutic interventions administered by the nurses caring for children that will reduce the psychological and physical distress suffered by children and their families. **Aim of the study:** To evaluate the effect of atraumatic care program on nurses' performance for children undergoing cardiac surgeries. Design: A quasi-experimental design was used to conduct this study. **Sample:** A convenient sample of all staff nurses in cardiac intensive care unit. A convenient sample of children with heart diseases undergoing cardiac surgeries cared by nurses in the time of atraumatic care program conduction. **Setting:** The current study was conducted in two cardiothoracic intensive care units at Cairo University Specialized Pediatric Hospital. **Tools for data collection:** Tool I, structured interview questionnaire and Nurses' Knowledge Assessment Sheet regarding Atraumatic Care. Tool II An observational checklist: Tool III Nurses' Attitude Assessment Sheet about atraumatic care: Tool IV: Child's Assessment Sheet: **Results** There were direct positive correlation between knowledge, attitude and skills of the studied nurses after atraumatic care program implementation. **Conclusion:** The current study concluded that there were statistical significant differences in the level of knowledge, skills, and attitude among the studied nurses in pre and post program conduction. Half of the children who received care by the studied nurses had higher comfort level. **Recommendation:** it was recommended that Integrate the atraumatic care program for nurses while caring the children.

Keywords: Atraumatic care, Nurses' Performance (knowledge, skills and attitude), Children Undergoing Cardiac Surgeries

INTRODUCTION

Atraumatic care as defined by Wong is "the provision of therapeutic care in settings by personnel, and through the use of interventions that eliminate or minimize the psychological and physical distress experienced by children and their families in the health care system (Calisir and Karatas, 2019). Atraumatic care is a form of therapeutic care that does not cause trauma to the child and family, whereas providing care focuses on preventing trauma and maximizing the growth and development of children in the hospital (Kartika et al. 2021).

Nurse must be inclined to apply the principles of atraumatic care while providing nursing interventions, so it will resulted in minimally traumatization of children. Atraumatic care

based on four main principles: the first is to prevent or limit the child breaking away from family. The second is to develop the sense of self-control in the child and family. The third is to prevent bodily injury and manage the pain in order to ensure the child comfort. And the fourth is modification of the physical environment around them (Kartika et al. 2021).

The first principle of atraumatic care is how to avoid or minimize bodily distress or pain to children. Pain management is essential to aid recovery from open heart surgery and facilitate cooperation with health care system. It can be through administering pharmacologic and non-pharmacologic approaches. Such as deep respiration, distraction techniques, relaxation, play therapy, guided imagery, and hypnosis (Wren et al. 2020).

The second principle of atraumatic care is how to prevent the impact of parental separation on children. It can be through, promoting family-centered care, using core primary nursing, and helping parents support the child during the procedure. There are interventions that promote family presence and minimizing child separation from family such as: allowing the person accompanying them to remain and ensuring their participation as partners in the child's care, allow mother to provide comfort by holding and help parents support the child during the invasive procedures (Lisanti et al. 2021).

The third principle is to stimulate a sense of control in children. Respect and elicit family's knowledge about child and health condition. Prepare the child for any unfamiliar procedure by simple explanation. Promoting the child's coping during the procedure, giving him/her control enabling their collaboration. Positive reinforcement, providing information to the child and family about the procedure (Czech et al. 2022).

The fourth principle of atraumatic care is modification of the physical environment around child in hospital. Such as: reduce fear of known, educate about environment and routines, make environment less threatening, preparing medications prior to entering the room; snack room, play room, try not to prepare in room, provide opportunities for control, allow child to have a familiar object food choices, hold teddy bear, allow privacy, allow play, provide choices, allow privacy, provide play activities and time structuring (Gordon and Martin, 2021).

Children with heart diseases are at particular risk for experiencing traumatic situations because of prolonged stays in the intensive care unit and multiple hospitalizations are usually necessary. Nurses must be knowledgeable about the human responses of these children; many of their responses are physiological, yet there are a multitude of psychosocial, behavioral and family responses that are also very important for the nurse to understand, diagnose and treat (Halemani et al. 2022).

Significance of the study

A large number of children have heart diseases need surgery to correct or palliate their heart defects. Moreover, surgery in some cases is the optimal and the real final treatment for pediatric congenital heart defects. Treatment of these defects depends on the severity of symptoms and whether the condition is life threatening. Many children with CHDs will

undergo one or several high-risk invasive procedures, such as cardiac surgery. Such events represent major disruptions within the family circle and psychological trauma may occur for both child and the family (Werner, El Louali, Fouilloux, Amedro, & Ovaert, 2019).

Through clinical observation as a clinical instructor in CICU the research investigator observed that nurses there had lack of knowledge regarding atraumatic care approach that affecting their practice with children. Atraumatic care approach is an innovative concept, research investigator hoped that pediatric nurses will implement more atraumatic care nursing services so that it can accelerate the healing process and is needed to help the children attain optimal recovery. Hence, the current study is undertaken to evaluate the effect of atraumatic care program provided for the nurses caring of children post cardiac surgery.

Aim of the study

The aim of the current study is to evaluate the effect of atraumatic care program on nurses' performance for children undergoing cardiac surgeries.

Research Hypotheses

1. Nurses who will receive the atraumatic care program will have higher total mean score of knowledge than before.
2. Nurses who will receive the atraumatic care program will have higher total mean score of skills than before.
3. Nurses who will receive the atraumatic care program will have positive or supportive attitude than before.
4. Children who will receive care from the nurses exposed to atraumatic care program will have comfort score less than 17 (more comfort).

METHODS

Research design

A quasi-experimental research design was utilized to achieve the aim of the current study.

Settings

The proposed study was conducted in two Cardiothoracic Intensive Care Units (CICU) at Cairo University Specialized Pediatric Hospital (CUSPH).

Sample

A convenient sample of staff nurses who provide direct care to children with heart diseases undergoing open or closed cardiac surgeries in CICU participated in the study (over six months and not less than 30 nurses and children whom cared by those nurses in the time of atraumatic care program intervention for statistical purposes) children under 5 years.

Data collection tools

The required data were collected through the following tools: -

Tool 1: It developed by the investigator after reviewing the related literature and consisted from two parts.

Part I: Structured Interview questionnaire: It include a personal data of nurses such as (age, level of education, years of experience in nursing profession, years of experience in the area of pediatric cardiothoracic surgery, gender and qualifications or previous training courses for the studied nurses).

Part II: Nurses' Knowledge Assessment Sheet regarding Atraumatic Care: Questions such as such as: definition of atraumatic care, benefit of atraumatic care, principles of atraumatic care and how to decrease children stressors during hospitalization.

Tool 2: Observational Checklist: Developed by the research investigator in the form of MCQ which consisted of forty (40) points evaluated nurses' skills such as clustering or organizing care to allow time for rest for the child, using of distraction technique to the child during invasive procedures, using of comfort measures, assess, measure and document child's level of pain, communicate appropriately using the child's preferred words, allow child to have a familiar object and help parents to support the child during the procedure.

Tool 3: Nurses' Attitude Assessment Sheet regarding Atraumatic Care: It constructed in the form of Three level Likert Scale, developed by the investigator to assess nurses' attitude in giving atraumatic care that reflecting the nurses' opinion, feelings and perception towards atraumatic care approach, contained twenty (20) points such as maintaining child safety, keeping privacy and reassurance.

Tool 4: Child's Assessment Sheet: It developed by the investigator after reviewing the related literature, in the form of multiple-choice questions (MCQs) and consist of two parts:

Part I: It involve six (6) MCQs about child's personal and medical data such as age, gender, birth order, diagnosis, past medical history and type of surgery.

Part II: Comfort B Scale: it assessed child's comfort level after application of atraumatic care program by the studied nurses. The COMFORT-B scale asks observers to consider intensity of six behavioral items: alertness, calmness, respiratory response (for ventilated children) or crying (for spontaneously breathing children), body movements, facial tension, and Muscle tone. with each assigned a score from 1 to 5 each main item contains 5 sub items scored as the following from 6 to 30. The observer selected one response from each sub items.

Validity and reliability

Data collection tools of the study were given to a group of 3 experts in the field of pediatric surgery and pediatric surgery nursing to test the content validity of the tools. The tools were examined for content coverage, clarity, relevance and applicability. Based on experts' comments and recommendations was performed. Reliability of tools was performed to confirm tools consistency using Cronbach's alpha and the reliability coefficients' alpha between questions was 0.77.

Procedures

The study was carried out in three phases: preparatory, implementation, and evaluation.

The preparatory phase:

Before conducting the current study, data collection tools developed by the investigator after an extensive review of pertinent literature. The atraumatic care program was developed supported by illustrated Arabic booklet. Official permissions obtained from the director of CUSPH and the head of cardiothoracic surgical units. The research investigator was introduced self to nurses and explained the aim of the study, the written informed consent obtained from each nurse after complete description of the purpose and nature of the study, the interview carried out in the meeting room of cardiothoracic intensive care units at CUSPH.

The investigator filled the structured interview questionnaire (part 1 in tool 1) from nurses through a structured interview on an individual basis to take personal data. Nurses filled the nurses' knowledge assessment sheet (part 2 in tool 1, in pre-test). Assessing skills regarding atraumatic care performed using observational checklist (tool2). Then evaluation of nurses' attitude by Likert Scale (tool 3).

The implementation phase:

The atraumatic care program provided to the nurses through four sessions (2 theoretical and 2 practical training sessions). Each session took about 30- 45 minutes for a group of nurses ranged from 2 to 5 nurses. The first theoretical session encompassed knowledge related to the aim of the program, guidelines of atraumatic care approach. Followed by the second theoretical session which contained knowledge related to principles. Then, the practical sessions which started at the first session by application of atraumatic care skills.

Finally, the second practical session emphasized on nonpharmacological pain management strategies, one of them apply comfort measures. Aided by the using of an instructional Arabic booklet and videos which developed by the research investigator.

The evaluation phase

Immediately and after one month of implementation of the atraumatic care program the knowledge of the nurses assessed as a post-test using (tool1). Observational Checklist (tool 2) used to evaluate the impact of the atraumatic care program on nurses' skills

regarding atraumatic care. Then nurses exposed to Nurses' Attitude Assessment Sheet posttest (tool 3) to assess their attitude regarding atraumatic care. For children who cared by nurses participated in atraumatic care program; comfort scale assessed, measured, and recorded by the researcher using (tool 4).

RESULTS

Figure (1) clarified that nearly two fifth (43.3%) of the studied nurses in the current study were diploma nurses and exactly two fifth (40%) were technical institute of nursing and low percentage (16.7%) were bachelor in nursing.

Figure (2) clarifies that more than two thirds (70%) of assigned nurses had 1-5 years of experience in nursing and 80% had 1-5 years of experience in PCICU.

Table (1) shows that more than half of the studied children (53%) diagnosed as cyanotic heart defects) and one third (33.3%) of them diagnosed as acyanotic heart defects. Regarding to frequency of hospital admission, two thirds (66.7%) had been admitted to hospital twice for follow up while more than half was recently admitted for open heart surgery.

Table (2) illustrates that there was statistically significant difference between before and after implementing atraumatic care program regarding nurses' knowledge about concept of atraumatic care, children's stressors, atraumatic care guidelines, child' preparation (0001*,0001*,0001*,0001*, respectively).

Figure (3) asserts that before implementing atraumatic care program, all of the studied nurses (100%) have unsatisfactory level of knowledge. While more than half (53.3%) of the nurses have satisfactory level of knowledge after week and 83.3% after month of nurses at the follow up phase. There was statistically significant difference between before and after week and after one month of implementing atraumatic care program regarding level of nurses' knowledge ($X^2= 43.0$, $p= .0001^*$, respectively).

Table (3) illustrates that there were highly statistically significant differences in nurses' skills regarding allowing parents support the child, increasing mother's knowledge, making environment less threatening, preparing the child to nursing procedures, ($p= .000^*$, $p= .000^*$, $p= .000^*$, $p= .000^*$ and, $p= .000^*$, respectively).

Table (4) shows that all dimensions of skills of the studied nurses have significantly increased post program such as maintaining child's safety increased from 40% to 86.7%, minimizing parent/child separation increased from 36.7% to 76.7%. The skills of the nurses at follow up also was even higher than post program. The total skills increased from 36.7% to 76.7% and then 90% at follow up.

Figure (4) illustrates that before implementing atraumatic care program, 13.3 % of nurses had satisfactory level of skills. While after week and month of implementing atraumatic care program, 96.7% of nurses had satisfactory level of skills after week and 93.3% after month of nurses at the follow up phase. There was statistically significant difference

between before and after week and after one month of implementing atraumatic care program regarding level of nurses' skills ($X^2= 77.4, p=.0001^*$, respectively).

Figure (5) asserted that before implementing atraumatic care program, 40% of nurses had positive attitude. While after week and month of implementing atraumatic care program, 83.3% of nurses had positive attitude after week and 76.7% after month of nurses at the follow up phase. There was no statistically significant difference between before and after week and after one month of implementing atraumatic care program regarding nurses' attitude ($X^2= 25.0, p= .006$, respectively).

Table (5) proved that there was direct positive correlation detected between knowledge, attitude and skills of the studied nurses. The highest correlation is between knowledge and skills of nurses after application of atraumatic care program ($r=0.71, p=0.0001^*$).

Apparently, from the Table (6) it was clear that there was statistically significant positive correlation detected between the nurses' total mean score of knowledge and their age, qualification, experience in nursing and experience in PCICU ($r= 0.71, p= 0.02, r= 0.8, p= 0.005^*, r= 0.53, p= 0.11, r= 0.38, p= 0.27$, respectively). In addition, there was statistically significant correlation between nurses' total mean score of attitudes and their age, qualification, experience in nursing and experience in PCICU ($r= 0.56, p= 0.08, r= 0.59, p= 0.07^*, r= 0.35, p= 0.31, r= 0.19, p= 0.59$, respectively). There was statistically significant correlation between the nurses' total mean score of skills and their age, qualification, experience in nursing and experience in PCICU ($r= 0.47, p= 0.44, r= 0.44, p= 0.19, r= 0.41, p= 0.23, r= 0.38, p= 0.26$, respectively).

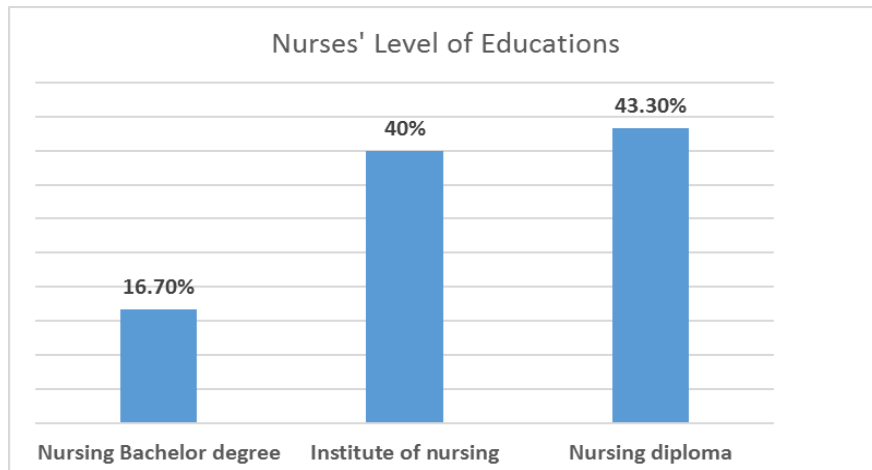


Figure 1: Educational Level of Assigned Nurses Who Caring Children After Cardiac Surgeries

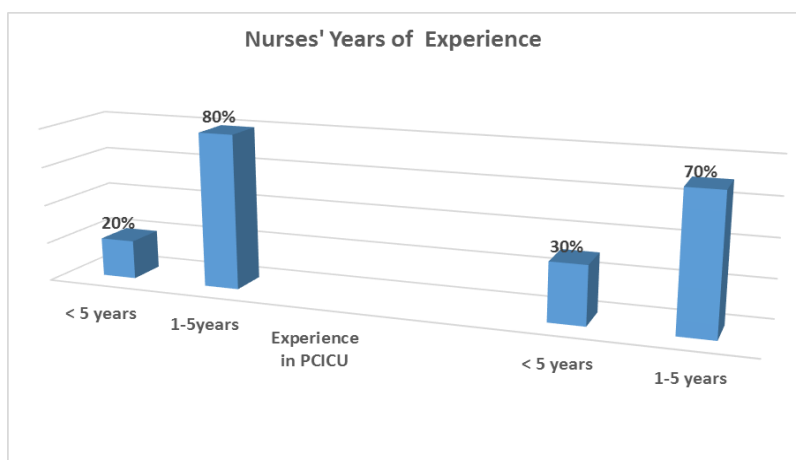


Figure 2: Percentage Distribution of the Studied Nurses according to Years of Experience in Nursing and PCICU

Table 1: Percentage Distribution of Medical Data of The Studied Children in the Current Study

Personal data	No.	%
Diagnosis		
A Cyanotic Heart	10	33.3
Cyanotic Heart	16	53.3
Acquired heart disease	4	13.3
Type of recent admission		
Open heart surgery	17	56.7
Closed heart surgery	13	43.3

Table 2: Comparison Between Knowledge Dimensions of the Studied Nurses at Three Times of program application.

Items	Knowledge												ANOVA test	p-value
	Pre		Post		Follow up		Pre		Post		Follow up			
	NO	%	NO	%	NO	%	Mean	SD	Mean	SD	Mean	SD		
Information about concept of atraumatic care	12	40	21	70	24	80	0.39	0.15	0.69	0.16	0.79	0.14	59.364	.0001*
Children stressors	18	60	24	80	26	86.7	0.60	0.30	0.81	0.20	0.87	0.19	11.146	.0001*
Atraumatic care guideline	16	53.3	22	73.3	24	80	0.53	0.20	0.72	0.22	0.80	0.19	13.717	.0001*

Child' preparation for hospitalization	12	40	19	63 .3	22	73 .3	0.40	0.09	0.64	0.16	0.74	0.18	42.839	.0001*
Reduce physical stress on the child hospitalization	13	43 .3	19	63 .3	22	73 .3	0.44	0.31	0.63	0.34	0.72	0.25	6.608	.002*
Total	14	46 .7	21	70	24	80	0.46	0.11	0.70	0.13	0.79	0.11	65.593	.0001*

*Significant at p-value<0.05

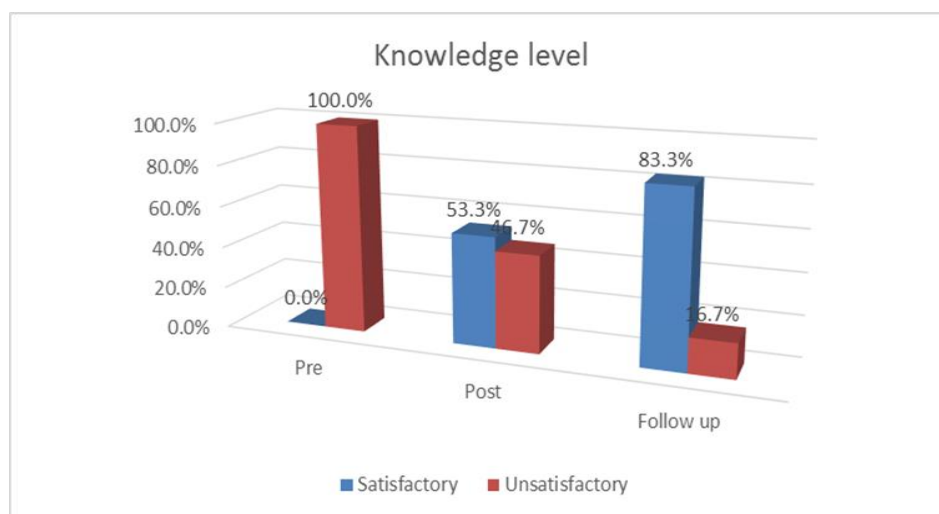


Figure 3: Level of Nurses' Knowledge about Atraumatic Care Program.

Table 3: Nurses' Skills About How to Minimize parent/child separation.

Nurses' skills regarding	Skills												ANOVA test	p-value
	Pre		Post		Follow up		Pre		Post		Follow up			
	NO	%	NO	%	NO	%	Mean	SD	Mean	SD	Mean	SD		
Parents support the child.	2	6.7	18	60	24	80	0.17	0.38	0.60	0.50	0.80	0.41	16.922	.000*
Increasing mother's knowledge.	7	23.3	27	90	30	100	0.73	0.45	1.00	0.00	1.00	0.00	10.545	.000*
Preparing the child.	4	13.3	27	90	29	96.7	0.43	0.50	0.90	0.31	0.97	0.18	19.976	.000*

*Significant at p-value<0.05

Table 4: Comparison Between Total Mean Score of Skills Dimensions of Studied Nurses

Items	Skills												ANOVA test	p-value
	Pre		Post		Follow up		Pre		Post		Follow up			
	NO	%	NO	%	NO	%	Mean	SD	Mean	SD	Mean	SD		
Minimize child's physical stressors	10	33.3	23	76.7	28	93.3	0.50	0.09	0.76	0.13	0.92	0.09	131.348	.0001*
Reduce other kinds of physical distress.	10	33.3	22	73.3	26	86.7	0.51	0.17	0.74	0.11	0.85	0.06	61.281	.0001*
Minimize parent/child separation	11	36.7	23	76.7	26	86.7	0.49	0.21	0.77	0.09	0.87	0.10	55.454	.0001*
Provide opportunities for sense of control	11	36.7	23	76.7	27	90	0.60	0.08	0.78	0.10	0.89	0.10	72.487	.0001*
Maintaining child's safety	12	40	26	86.7	29	96.7	0.53	0.45	0.87	0.29	0.98	0.09	16.408	.0001*
Total	11	36.7	23	76.7	27	90	0.53	0.08	0.77	0.05	0.89	0.04	273.173	.0001*

*Significant at p-value<0.05.

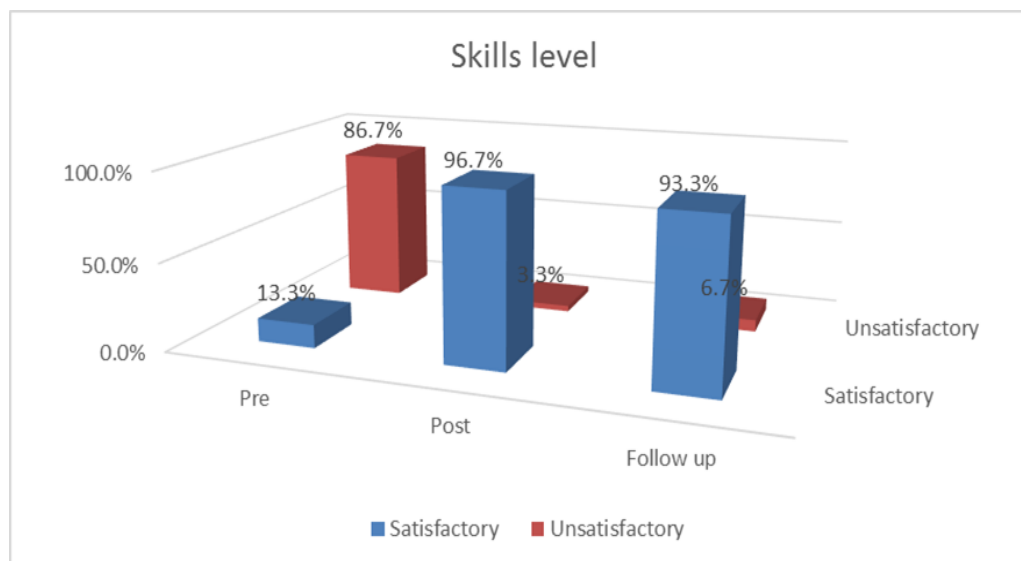


Figure 4: Level of Nurses' Skills about Atraumatic Care Program.

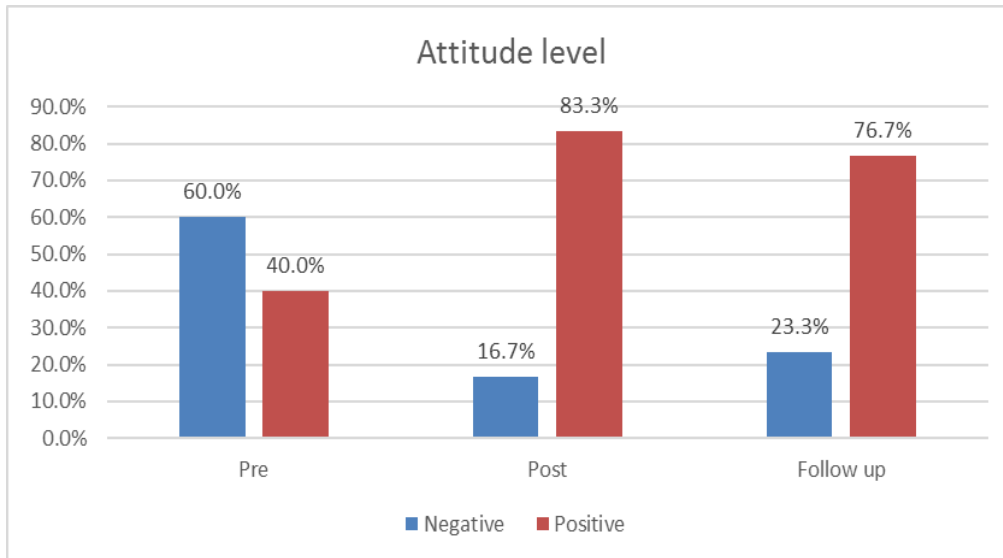


Figure 5: Level of Nurses' Attitude toward Atraumatic Care Program

Table 5: Correlation between nurses' level of knowledge and their attitude & skills

Scores	Scores	
	Knowledge	
	R	P
Attitude	0.4	0.0001*
Skills	0.7	0.0001*

*Significant at p-value<0.05.

Table 6: Correlation between total scores of studied nurses' knowledge, skills & attitude and selected demographic data

Scores	Scores					
	Knowledge		Attitude		Skills	
	r	p	r	p	r	P
Age	0.71	0.02*	0.56	0.08	0.47	0.16
Qualification	0.8	0.005*	0.59	0.07*	0.44	0.19
Experience in nursing	0.53	0.11	0.35	0.31	0.41	0.23
Experience in PCICU	0.38	0.27	0.19	0.59	0.38	0.26

*Significant at p-value<0.05

DISCUSSION

Regarding the studied nurses' level of education, nearly two fifths of nurses had secondary school diploma and exactly two fifths graduated from technical institute of nursing, while a minority of them had nursing bachelor degree. In the same direction, Khaliel, Mohamed and Ghonaem (2022) reported that 42.5% of the studied nurses

graduated from technical institute of nursing while 40% and 17.5% graduated from secondary school diploma and nursing bachelor degree, respectively.

Another Egyptian study held by Badr, Morsy and Ali (2022) who evaluated critical care nurses' knowledge and practices regarding pain assessment and management at Cairo University Hospitals and revealed that near half of the studied nurses (48.3%) were secondary school diploma nurses, while 30%, 21.7% were nursing technicians and baccalaureate nurses respectively.

The current study findings revealed that more than two thirds of the studied nurses` had 1-5 years of experience in nursing profession and the majority of them had 1-5 years of experience in PCICU. In the same context, an Egyptian study conducted by Khaliel, Mohamed and Ghonaem (2022) in Benha University Hospital, aimed to evaluate nurses' performance regarding safety measures in cardiac catheterization unit, it was found that 62.5% of the studied nurses' years of experience in the cardiac catheterization unit were less than 5 years. This result may be due to that the highest percentage of the studied nurses were juniors.

In the same direction, a study conducted in Omdurman Military Hospital by Mohammed, (2017) which "evaluated nurses' knowledge regarding post cardiac arrest care in Intensive Care Unit, and concluded that more than half of nurses had experience between 1-3 years in ICU". As well Feroze, Afzal, Sarwar, Galani, and Afshan (2017) were studied "knowledge and practice of registered nurses about patient safety after cardiac catheterization in Punjab institute of cardiology hospital in Lahore", it was found that most of the nurses had less than five years of experience. This result also might be due to high level of burn out among pediatric cardiac catheterization' nurses.

On the other hand, this finding disagreed with the result of Abo El-ata, Shehab and El-Zayat (2020) which revealed that slightly more than two-fifth (42%) of the studied nurses had experience between five to less than ten years. Consistently, an Egyptian study conducted by Habib, Mohammed and Ibrahim (2022) aimed to assess disaster management among El-Monira Hospital health providers, it was clear that 35.0% of the nurses had experiences in specialty ranged between 5 - < 10 years.

Concerning the characteristics of the studied children, the current study findings reflected that more than half of the children diagnosed as cyanotic heart defects. These findings correspond to analytical cross-sectional study conducted from September 2017 to July 2018 at CUSPH by Kotb et al. (2022) who found that (12% ,14%, 14% & 10% respectively) were operated for open heart surgery or closed heart surgery to repair TGA, Fallot Tetralogy, complete atrioventricular canal defect , double outlet right ventricle respectively, tetralogy of Fallot was the most common cyanotic CHD. As well as one third (33.3%) of children diagnosed with acyanotic heart defects (ASD.VSD.PDA).

Concerning nurses` knowledge regarding children stressors and how to reduce them, the current study results indicated that there was a statistically significant difference between before and after implementing of atraumatic care program. Children stressors were

categorized by nursing interventions, fears of being a patient, and fears caused by the developmental stage of the child, unfamiliar environment or lack of information, child-staff relations, the physical, social, and symbolic environment.

In accordance, Siregar and Kaban, (2016) performed a quasi-experimental study which confirmed that modifying physical environment nuanced children can increase the fun, feeling safe and comfortable environment for the child. So that the child is always evolving and feel comfortable in their environment. Using of multi-colored clothes nonconventional nurses preferred by children and parents whose children are hospitalized. Emotional support is a key component in creating a comfortable environment.

In addition Lundberg, Eriksson, Lind, Coyne, and Fjellman-Wiklund, (2021) conducted a qualitative study emtitled "How children with juvenile idiopathic arthritis view participation and communication in healthcare encounters" it was concluded that Over time, children can become more familiar and at ease with healthcare situations when they feel safe and experience personal and positive encounters. When children are prepared for the encounter, provided with the space and support they want and receive tailored help they are more enabled to participate.

Additionally, Santapuram, Stone, Walden and Alexander, (2021) in a narrative review confirmed that preoperative anxiety from clinical and healthcare system perspectives has been linked to increased postoperative pain, a greater need for analgesia intraoperatively and numerous worsen effects. So preoperative education encompasses the use of formal or informal teaching or educational materials to prepare children and their families for an operation. The researcher views that mobile applications and virtual reality has opened up new opportunities for audiovisual education involving interactive elements as away of child` preparation.

The current study results asserted that before implementing atraumatic care program none of nurses had satisfactory level of knowledge compared to more than half of the nurses after one week and majority of nurses after one month at the follow up phase. In the light of previously mentioned results, the current study findings denoted the positive effect of atraumatic care program on nurses' knowledge.

A recent descriptive analytical study conducted by Yulianti and Kurnaesih (2022) for the aim of assessing knowledge and attitude factors of nurses dealing with atraumatic application care to child patient, it was assure that most of the nurses are in the category of poor knowledge level about the application of atraumatic care as many as 30 people (90.9%). Knowledge of nurses is good as much as 1 person (3.0%) and knowledge of nurses is not good as much as 2 people (6%). From the researcher point of view knowledge and understanding is a very important domain in shaping one's actions. Before a person adopts a behavior, he/she must first know what the meaning or benefit of the behavior is. Nurses will carry out atraumatic care well if they have enough knowledge about the definition, goals, benefits, principles and interventions of atraumatic care.

From the researcher point of view, there was multiple causes helped the studied nurses to have a satisfactory knowledge regarding atraumatic care after implementation of program. The age, the advantages of nurses in young age group are being knowledge seeking which is always required in such crucial /vital wards. The education, two fifth of them were holding technical institute of nursing which is a kind of benefit for gaining more knowledge. Moreover, attending sessions about atraumatic care approach had an effective role in refreshing feed-back about this concept.

The current study results proved that the skills of the studied nurses regarding how to minimize child's physical stressors for children has significantly increased post program such as providing comforting touch to calm the child during vigorous procedures. These results of the current study were in accordance with empirical evidence, and previous cited experimental study by Efe, Erdem, Caner and Güneş, (2022) conducted to evaluate the effects of gentle human touch on pain, comfort, and physiologic parameters in infants, showed that comfort mean scores of infants in the gentle human touch group were lower.

Additionally, a recent study conducted by Khaleghi, Fomani and Hoseini (2023) whom measured the effect of the comfort care model on distress, pain, and hemodynamic parameters in infants after congenital heart defect surgery confirmed that pharmacological treatment methods, which are commonly used in pain relief, are effective methods in reducing pain. However, it is also recommended to use non-pharmacological pain relief methods due to the side effects of medications, especially in children.

As regard to minimizing parent & child separation, the current study revealed significantly increasing in nurses` skills post program in many items such as allowing parents to support the child during invasive procedures. In a systematic review conducted by Handayani and Daulima (2020) about "Parental presence in the implementation of atraumatic care during children's hospitalization" the results of the study found that the pain level of children whose parents were present on the side during an invasive procedure and were involved in the procedure was lower. Given these results, we believe that parental involvement and support during invasive procedures will be effective in reducing pain levels.

Also, the previously mentioned study conducted by Handayani and Daulima, (2020) explained that the presence of parents in implementing atraumatic care has a positive impact on children during hospitalization. Caregivers can also help support their child with distraction and soothing words while assisting with comfort positioning. From the researcher point of view, family presence should always be encouraged, while taking caregiver preferences into account. Each hospital needs to review related policies in facilitating the presence of parents for children during hospitalization.

The current study results confirmed that after implementing atraumatic care program almost nurses had satisfactory level of skills compared to less than one quarter before implementation. Unfortunately, There is scars study in evaluating skills of nurses regarding atraumatic care concept as awhole but it is fragmented principles.

In the same line, A descriptive, exploratory, quantitative study by Francischinelli, Almeida and Fernandes (2018) who studied "Routine use of therapeutic play in the care of hospitalized children, from the nurses' perceptions" confirmed that using of therapeutic play as a type of atraumatic care is among the strategies that make it possible to create a hospital space that is more humane, differing from the categorizes of fear and anxiety that are present in the daily lives of children, who are undergoing procedures that are painful and distressing.

The result of the present study asserted that before implementing atraumatic care program, two fifth of nurses had positive attitude. While after week and month of implementing atraumatic care program, majority of nurses had positive attitude after week and three quarters after month of nurses at the follow up phase.

On the same line, Suminar, Yulianti and Kurnaesih (2022) showed that almost all nurses have a positive attitude towards the application of atraumatic care as many as 30 people (90.9%). A small number of nurses have a negative attitude towards the application of atraumatic care, as many as 3 people (9,1%). Additionally, Mediani, Hendrawati and Shidqi (2019) according to the frequency distribution in the study, a large majority of the participants (89%) gave favorable attitude in applying atraumatic care, while only eight of them (11%) were not supportive in this respect.

The study proved that there was direct positive correlation detected between knowledge, attitude and skills of the studied nurses. In the same approach, Elias, Prashanth, Shenai and Varghese (2019) found that there was a positive correlation between knowledge and attitude of staff nurses regarding assessment and management of pain in children, ($r = 0.467$).

Additionally, Mediani, Hendrawati and Shidqi (2019) confirmed that attitude is informed by knowledge. When children are hospitalized, their risk of experiencing trauma escalates and thus calls for suitable intervention. Consequently, pediatric nurses are required to have good knowledge and attitude regarding atraumatic care in order to minimalize the potential damage caused by hospitalization. The higher of the education, the more advanced the knowledge and attitude.

The current study emphasized that there was statistically significant positive correlation detected between the nurses' total mean score of knowledge and their age, qualification, experience in nursing and experience in PCICU. These results agreed with Shetty (2019) who studied "Assessment and Management of Pain in Children: Knowledge and Attitude of Staff Nurses" showed that there was a significant association between the knowledge and the years of experience of the staff nurses ($p < 0.05$), attitude and years of experience of the staff nurses ($p < 0.05$) and the attitude and the current working unit of the staff nurses ($p < 0.05$).

CONCLUSION

There was statistically significant difference between before and after one week and after one month of implementing atraumatic care program regarding level of nurses' knowledge. There was statistically significant difference between before and after one week and after one month of implementing atraumatic care program regarding level of nurses' skills. There was no statistically significant difference between before and after one week and after one month of implementing atraumatic care program regarding nurses' attitude. The highest correlation was between knowledge and skills of nurses after application of atraumatic care program.

RECOMMENDATIONS

Based on the results of the current study, it was recommended that:

- Integration of the atraumatic care program for nurses who are caring for children specially in the postoperative period.
- Training sessions and educational classes should be planned for nurses about caring the children from admission till recovery.
- A simple Arabic illustrated booklet about atraumatic care concept should be available in every cardiac intensive care units to guide nurses on scientific knowledge, skills and attitude.
- A multidisciplinary team approach should be developed, implemented, and evaluated educational sessions for nurses who are caring for children to achieve better recovery and little hospital stay.
- Communication with the national nursing authorities and recommend the need to apply the family centered care.

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