Guiding Program for Mothers to Enhance Home Care and Children's Health Outcomes after Cardiac Surgery

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Abstract

Background: Serious problems can occur after cardiac surgery, so mothers need more comprehensive home care educational programs to help them recognize complications and care for their children following hospital discharge. The **Aim** of the study was to evaluate the effect of a guiding program for mothers on enhancing home care and the health outcomes of their children after cardiac surgery. A quasi-experimental **design** was used to conduct the present study at the Cardiothoracic Surgery Department and Pediatric Outpatient Clinic at Zagazig University Hospitals. **Subjects:** A sample of 48 mothers and their children scheduled for cardiac surgery at the previous settings. **Tools:** Three tools were used to collect data. A Structured Interview Questionnaire, Reported practice checklist and Children' assessment sheet. **Results:** Statistically significant differences regarding mothers' knowledge and reported practice were observed at the post-program and follow-up phases, with a statistically significant strong positive correlation between them. Statistically significant improvements also revealed regarding children' health outcomes post program. **Conclusion:** The guiding program had a profound effect on enhancing mothers knowledge and practice about home care as well as children's health outcomes after cardiac surgery. The study **recommended** that educating mothers regarding the care of their children after cardiac surgery should become a routine practice at the cardiothoracic surgery department. Moreover, in service training program for pediatric nurses to improve their performance about care provided to children after cardiac surgery.

Keywords: Guiding Program; Health Outcomes; Cardiac Surgery; Home Care

Introduction

Congenital heart disease (CHD) is one of the most prevalent disorder, affecting approximately 0.8% to 1.2% of live births worldwide **(Wu et al., 2020).** Typically CHD is defined as anatomical problems that result from abnormal formation of the heart or major blood vessels apparent at birth. Numerous anatomical forms of congenital heart abnormalities are known. Most defects can now be treated due to significant advancements in detection and therapy **(American Heart Association, 2022).**

Congenital heart abnormalities are classified as mild, moderate or severe. The most prevalent CHD subtypes globally are Atrial Septal Defect (ASD) and Ventricular Septal Defect (VSD), which account for around one -third of CHD. On the other hand, the incidence of newborns with single ventricle physiology and other severe CHD types has decreased during the past 30 years in all regions due to prenatal screening **(Baumgartner et al., 2021).**

The etiology of CHD is complex as a result of both genetic and environmental factors during fetal and early life. Environmental causes that raise the risk of CHD include maternal exposure to pollutant as pesticides, herbicides, lithium, smoking, alcohol as well as obesity, diabetes mellitus, malnutrition, rubella, and low socioeconomic level **(Hammad et al., 2022).** Over the last decades, ongoing advancements in pediatric cardiology, cardiac surgery and interventional cardiology have significantly improved the course of CHD, leading to a decrease in early mortality worldwide, especially in high-income countries **(Diller et al., 2021).** The disease burden caused by CHD is still severe in developing countries. CHD is a significant cause of disability that typically requires early surgical repair following birth to improve results, which always causes a serious financial burden **(Zhang et al., 2022).**

To increase the positive response of families of children with heart disease, it is vital to provide guidance on hygiene, food, physical activity, and others after performing cardiac procedures **(Ni et al., 2019).** Health education programs for mothers in advance of hospital discharge should be started as soon as possible in order to reduce uncertainty and give mothers confidence that they can care for their children at home, as well as identify symptoms of a worsening clinical condition and

seek care in a health facility. After cardiac surgery, good hygiene for children is crucial in order to achieve excellent outcomes and avoid adverse effects like surgical site infection **(Stavesky et al., 2016).**

In developing countries, the majority of children with heart defects are now receiving therapy for their condition, but for successful outcomes, they also need effective home care. Caregivers of children with CHD need to provide their children with the utmost care as possible. Caring for a child requires practicing dietary guidelines, appropriately administering medications, providing the necessary dental care, applying infection prevention techniques, recognizing when to seek medical assistance, and continuing to engage in activities that are suitable to the child's stage of recovery. Parents particularly mothers, must be educated about post-operative home care for children. Failure to do so may result in complications and unfavorable results **(Gaskin et al., 2016).**

Home care is essential for child guardians following surgical repair because it provides guidance on how to care for the child, increases mothers' knowledge and confidence prior to discharge, reduces the likelihood that the child will need to be readmitted, and motivates mothers to provide skilled care **(Callé et al., 2021).** The nurse must explain discharge instructions to mothers before they leave the hospital. The nurse must give mothers sufficient information and instructions about how to care for their children and what to expect during the first few weeks, as well as assist the child in pain, schedule follow-up appointments to assess the child's recovery, and provide the necessary exercises to help the child physically **(Brida & Gatzoulis, 2020).**

Significance of the study

Heart disease is the leading factor in pediatric morbidity and mortality. According to **Hammad et al., (2022),** 8 - 12 per1,000 live births are CHD cases. In Egypt, the mothers still require programs to assist them after heart surgery with support, guidance and preparation to care for their children in order to overcome this period successfully. These programs should give mothers knowledge and practice for improving the care of their children at home, despite the routine information about discharge care that is provided after cardiac surgery **(Callé et al., 2021).**

For their complicated medical condition, children with CHD are now receiving surgical correction or palliation. Additionally, educational programs prepare mothers to provide their children with better home care following heart surgery. To prepare mothers for maintaining their children's health and to prevent post-operative problems, early and ongoing home care education is essential **(Shahmoradi et al. 2022).** In order to improve postoperative outcomes, the researchers decided to conduct this study, hoping that the findings would show mothers how to care for their children at home.

Operational definitions

Home care is the creation of a care plan for a child who is being discharged from the hospital in order to improve the mothers' readiness for discharge with regard to the management of wounds, techniques of preventing infection, safe medications, early detection of complications, pain management, providing healthy nutrition, oral care and scheduling follow up appointments.

Aim of the study:

The aim of this study was to evaluate the effect of guiding program for mothers on enhancing home care and children's health outcomes after cardiac surgery.

The objectives of this study were to:

1. To assess mothers' knowledge about home child care following cardiac surgery.
2. To evaluate mothers' reported practice about child care at home following cardiac surgery.
3. To assess children's health outcomes after implementation of guiding program.

4. Designing, implementing and evaluating effect of guiding program on improving home care and health outcomes of children after cardiac surgery.

Research hypothesis:

The following research hypotheses were developed in order to achieve the aim of this study:

H1: Mothers will have satisfactory knowledge about home care after the implementation of the guiding program.

H2: Mothers will report satisfactory home care practice following implementation of the guiding program.

H3: Health outcomes of children will improve after implementation of the guiding program.

Subjects and methods:

Research design

This study was performed using a quasi-experimental design (Pre-, Post-, and Follow- up test). A quasi-experiment is an empirical interventional study used to estimate the causal impact of an intervention (guiding program) on target population without random assignment

Study Setting

The study was conducted in the following settings: Cardiothoracic Surgery Department at Cardiac and Thoracic Hospital and Pediatrics' Cardiac Radiology Unit at Pediatric Zagazig University hospitals. Pediatric Cardiothoracic Outpatient Clinic at Zagazig University Hospitals. The Cardiothoracic Surgery Department is located on the fifth floor of the Cardiac and Thoracic Hospital, which consists of three rooms, each with four beds. The Outpatient Pediatric Cardiology Clinic is presented on the fourth floor of the outpatient clinic building at Zagazig University Hospital.

Study Subjects

A purposive sample composed of 48 (mothers and their children) undergoing cardiac surgery who accepted to participate in the study. **Inclusion criteria** include age from birth to 18 years, both sexes and children scheduled for open heart surgery. Children with associated extra cardiac defects or genetic conditions were excluded from the study.

Calculation of sample size

It was shown that a sample composed of 48 mothers was required to conduct this study assuming that satisfactory knowledge of post open heart operative wound care and prevention of infection was 53.3%, which improved to 80% after one month of follow- up **(ELsobky and Amer, 2018),** using an open Epi program with a test power of 80%, a confidence level CI 95% and an alpha error = 0.05.

Tools of Data Collection

Tool I: A Structured Interview Questionnaire

The questionnaire was developed by the researchers with the guidance of supervisors and in accordance with the literature, [**Hockenberry & Wilson, 2015; Ward et al., 2016; Hockenberry et al., 2017; Pino et al., 2017].** It was constructed in Arabic – language in the form of multiple choice questions and closed ended questions to assess the following parts:

Part 1: Demographic characteristics of studied mothers: such as age, educational level, occupation, residence, parental consanguinity and source of previous information.

Part 2: Mothers' knowledge about open heart surgery, including definition, causes, indications, risk factors, duration, preparation for surgery and postoperative complications.

Part 3: Mothers' knowledge about home care: It consisted of twenty-six multiple choice and closed ended questions covering various aspects of home care, such as surgical wound care (precautions to maintain wound healing), signs & symptoms of infection, nutritional instruction, pain management methods, medication instruction, dental care, activity allowed & restricted, rest & relaxation after surgery, follow up appointments; common behavior disturbances after discharge…….etc. the **Scoring system of knowledge** was one score for correct response and zero for an incorrect response or I do not know. The total score of mothers' knowledge was (93) degrees. It is considered unsatisfactory if < 70% and satisfactory if ≥ 70%.

Tool II: Mothers' Reported Practice Checklist:

It was formulated by the researchers to evaluate mothers' daily home care practice for their children after cardiac surgery as guided by **Wong (2016); Debra et al., (2017); Hockenberry et al., (2017); and Jonkman (2019).** It includes 12 questions covering the following areas: incision care, bathing, clothing, prevention of wound infection, methods of relieving postoperative pain, nutritional guidance, dental care and immunization…etc.

Scoring system: one score for items that were done correctly and **zero** for items that were not done or incorrectly done items. The total score was summed up and classified as either satisfactory (≥70%) or unsatisfactory (<70 %). The total score of practice was 77 degrees, classified as follows: incision care (12 marks); bathing practices (2 marks); clothing practices (2 marks); methods to prevent wound infection (9 marks); medication administration correctly (9 marks); relief of postoperative pain (7 marks); nutritional guidance (8 marks); dental care (4 marks); immunization (3 marks); activity after surgery (6 marks); follow up appointments (5 marks); complications and problems to report to the doctor (10 marks).

Tool III: Children' Assessment Sheet

This tool was developed by the researchers based on updated literature reviews. It was divided into three sections:

Section 1: Demographic characteristics of the studied children, involving age, gender, birth order and educational level.

Section 2: Medical history of children, including past and current history as age of diagnosis, type of congenital heart disease, presence of respiratory problems, family history of disease, previous hospitalization, and duration of hospital stay.

Section 3: Children' health outcomes:

It was used to assess children' postoperative symptoms and complications at various body systems concerning cardiovascular, respiratory, gastrointestinal, neurological, psychological problems, wound complications, sleep disturbance, in addition to problems in social life and hospital readmission, as guided by **[Al-Daakak et al., (2016); Sabaq& Abd el Sadek (2019) and Berndt (2020)].**

Scoring system: one score was given for the presence of postoperative symptoms and zero for the absence of postoperative symptoms.

The guiding program description:

The objective of the program was to effectively educate and train mothers about home care practice in order to improve the health outcomes of their children undergoing cardiac surgery. The program was developed through the following phases:

(I) Pre-program phase (assessment):

On admission, each mother and her child were interviewed individually to assess demographical characteristics, disease' history, mothers' knowledge and reported practice related to daily home care (Tools I, II and III).

At hospital discharge, children's health outcomes were also evaluated (pre-test). This stage took about 25-35 minutes and helped in identifying the mother's knowledge gaps, providing extra insight and designing the guiding program in accordance with outcomes.

(II) Planning Phase:

The program was developed by the researchers, taking into account the findings from the assessment phase, the pilot study and pertinent literature [**Hockenberry & Wilson, 2015; Hockenberry et al., 2017; Jonkman, 2019].** The guiding program was designed in the form of a booklet according to identified demands, requirements and deficiencies. The program is composed of two fundamental parts:

The educational (theoretical) part comprises all knowledge about cardiac surgery and daily home care through the first two sessions.

The training (practical) part deals with home care practices through the remaining sessions. Teaching methods involved lectures, group discussions, role-plays, demonstrations and reinforcement.

Teaching media were prepared in the form of handouts (booklet), brochures, color posters, pictures and videotapes.

(III) Implementation Phase:

The program was conducted in four sessions, with one-on-one interviews with each mother to aid in the learning process. Each session's duration varied based on the content and the mother's response. Each session lasts for 30 - 35 minutes, followed by 5-10 minutes for discussion and providing feedback. The sessions were presented in plain Arabic, adapted to the mother's level of understanding. Motivation and reinforcement were provided throughout each session to encourage active maternal participation and facilitate learning. Each mother in the group received a teaching booklet by the end of the training sessions. The training process was implemented in the following sequence:

Session 1: It provided an overview of open heart surgery including definition, causes, indications, risk factors, duration, preparation for surgery and postoperative complications.

Session 2: In this session, mothers were educated about nutritional instruction, rest & relaxation after surgery, permitted & restricted activities, the perfect time to go back to school, resume activity & participate in outdoor exercises. In addition, behavioral problems often occur after discharge from the hospital.

Session 3: Through this session, the targeted mothers were educated and trained about the management of postoperative complications (incision care principles, signs & symptoms of wound infection, methods to prevent wound infection, measures to relieve postoperative pain, relaxation techniques such as breathing exercises, compliance with a healthy diet and dental care).

Session 4: Training continued regarding the following daily practice as bathing, dressing the child, postoperative sleeping position, administering medication correctly, immunizations, scheduling follow-up appointments and discussing when to seek medical attention in case of complications.

(IV) Evaluation Phase:

The effect of applying the guiding program was assessed by comparing differences in mothers' knowledge, practice and children' health outcomes at the pre-, post- and follow- up phases. The studied mothers were re-interviewed immediately after implementing the program and re-evaluated using the same assessment tools. A follow-up was performed one month following discharge at the Pediatric Cardiothoracic Outpatient Clinic/Pediatrics' Cardiac Radiology Unit.

Content validity and reliability:

A panel of five medical and nursing professors and specialists in the fields (two professors of pediatric nursing, one professor of cardiology, one professor of pediatric cardiothoracic surgery, and one professor of pediatrics) reviewed the tools that had been developed for the purpose of validity assurance after reviewing the appropriate literature. Minor adjustments were made in response to expert evaluation and suggestions, and the finished form was then available for use. Internal consistency and reliability factors of tool components were determined using the Cronbach alpha test. The reliability of the knowledge questionnaire, reported practice checklist and health outcomes sheet was (r=0.901, 0.871&0.826) respectively.

Administrative and Ethical issues

The Zagazig University Faculty of Nursing's Research Ethics Committee (REC) and Postgraduate Committee both gave their approval for this study. At every stage of the study, all ethical concerns were taken into account. Each mother was informed of the study's goals and methods, and verbal agreement was acquired. The freedom of participants to discontinue the study at any moment was emphasized by the researchers. Additionally, we guarantee the confidentiality and anonymity of sample data that is exclusively utilized for study.

Pilot study

A pilot study was carried out on 10% of the studied subjects (5 mothers and their children scheduled for heart surgery) to assess the tools' content, clarity, viability, arrangement, and appropriateness, as well as to determine how long it would take to complete the data. The required

adjustments were performed in accordance with this pilot study. Mothers who took part in the pilot trial were not included in the analysis.

Fieldwork

- A formal acceptance was obtained to perform the study by submitting an official letter from the Faculty of Nursing' Dean to the relevant authorities of the chosen settings clarifying the goals and procedure of data collection.
- The study was completed within eight months from March 2022 to October 2022.
- At the beginning of the interview researchers provided mothers and children with emotional support and reassurance to deal with their fears and anxieties, also informed them of the study's objectives, content and benefits of participating in the study.
- Upon admission, written informed consent was obtained from each mother and her child wishing to participate in the study. The researchers also set a meeting place and schedule then started to gather information about characteristics, medical history, also assess mothers' knowledge and reported practices about home care using the tool (I,II& III) (pretest).
- While preparing for surgery; the theoretical part of the program was delivered to mothers through the first two sessions held two days prior to surgery and the practical part was received through the next sessions after surgery.
- After discharge, mothers were received follow-up phone calls and messages though (WhatsApp) to remind them of follow-up appointments, and discussed any concerns about home care practices.
- One month after discharge, follow-up was performed at the Pediatric Cardiothoracic outpatient clinic/ Pediatrics' Cardiac Radiology Unit to re-evaluate mothers and determine if mothers were following guiding program instructions.
- The researchers met the subjects in the morning and afternoon shifts between 9.00 a.m. and 5.00 p.m. In order to collect data and carry out the guiding program, the researchers visited the study locations four days a week (Sunday, Tuesday, and Wednesday) at the Pediatric Surgical Department and (Monday) at the Pediatric Cardiothoracic Outpatient clinic at Zagazig University Hospital.

Statistical Analysis

Using a Personal Computer (PC), all data gathered from the examined sample were revised, coded, and input. The Statistical Package for Social Sciences (SPSS) version 22 was used for statistical analysis and computerized data entry. Descriptive statistics were used to show the data as frequencies, percentages, Mean and SD. To evaluate the association between different study variables, a Pearson correlation coefficient was generated. One method for modeling the relationship between one continuous dependent variable and one or more independent variables is linear regression.

Cochran's Q Test was used to compare nominal data in multiple related groups or repeated measures through three phases of the study. Pearson's chi-square test (X2) was used to identify the statistically significant relationship for categorical data. Using Cronbach's Alpha, the internal consistency and reliability of the tool's parts were assessed. Statistical significance was considered at a p value <0.05, while highly significant at a p-value < 0.01.

Results:

Table 1 clarifies the demographic characteristics of the studied mothers. About 54.2% of the studied mothers were in the age group of 30-40 years. As regards educational level, 52.0% continued their secondary or diploma education, while 31.4% were illiterate. In addition, 70.8% were housewives, and 66.7% belonged to rural areas. Parental consanguinity was found in only 37.6%. Besides, 58.3% had no previous information about cardiac surgery.

Table 2: shows that the mean age of the studies children was 7.64 ± 1.97 years. Males accounted for 62.5%. Those who ranked in second birth order comprised 45.8%, and 54.2% of those enrolled in primary education. It was disclosed

that 35.4% of children were diagnosed during the first year. A positive family history of the disease was found in 45.8% of the studied group. About 62.5% of the studied children were previously hospitalized and 66.8% of them stayed at the hospital for less than or equal 5 days postoperatively.

Fig 1 shows that the most common types of congenital heart disease are ASD followed by VSD which constitute 43.7% and 25.0% respectively.

Table 3 illustrates that there were marked statistically significant improvements in mothers' total knowledge scores at posttest and follow-up phases when compared to pretest (F=12.334 with P=.000**).

Table 4 clarifies that there were marked statistically significant improvements in each item of mothers' reported practice throughout the study phases. As evidence, the pretest results showed that only 4.2% of the studied mothers had satisfactory scores regarding the care of the incision. This percentage improved to 87.5% and 81.3% at the post- and follow-up phases respectively. Moreover, all of the studied mothers had satisfactory practice scores about dental care and follow-up appointments in both the post- and follow-up phases when compared to the preprogram phase.

Total score of mothers' reported practices was represented in **Fig .2.** It is noticed that, 16.70% of mothers had satisfactory total practice pre-program implementation this percentage improved to 89.60%, 85.40% at post and follow-up phases respectively.

Table 5 summarizes children' health outcomes post cardiac surgery. The results revealed a markedly statistically significant improvement regarding the health outcomes of the studied children at one month after the application of the program when compared to before.

Table 6 explains the correlation between the total knowledge score and the total reported practice. Throughout the entire study phase, there was a statistically significant positive association between total knowledge and total reported practice scores.

Table 7 shows that a highly significant model was found using the f test (10.904, p =.000). This accounts for 48% of the variation in moms' knowledge that R2 0.46 identified. Moreover, it reflects that the source of information had a slight positive frequency effect on mothers' knowledge at p=<0.05. While age and educational level had high positive independent predictors of mothers' knowledge at P=(.007) and (.003) respectively. On the other hand, residence, parent consanguinity and occupation had no significant effect on mothers' knowledge at P= >0.05.

Table 8 demonstrates the highly significant model that was discovered using the f test (8.444, p =.004). This explains 46% of the variation in mothers' practice detected through R2 0.46. Additionally, it reflects that mothers' practice were slightly positively affected by age, occupation, and source of information at P= <0.05. While education level had a high positive predictor on their mothers' practice at P=.004. On the other hand, residence and parent consanguinity had no significant effect on mothers' practice at P= >0.05.

Table (1) Demographic characteristics of the studied mothers (N= 48)

Characteristics	N	%
Mothers' age: : (in years)		
<20	4	8.3
20 < 30	12	25.0
30 – 40	26	54.2
>40	6	12.5
$\bar{x}$ ± SD	32.08 ± 2.76	
Level of education:		
Illiterate	15	31.4
Primary education	4	8.3
Secondary education/diploma	25	52.0
University/ higher	4	8.3
Occupation:		
Housewife	34	70.8
Worker	14	29.2
Residence:		
Rural	32	66.7
Urban	16	33.3
Parental consanguinity:		
Yes	18	37.6
No	30	62.4
Source of information:		
No information	28	58.3
Health personnel	10	20.8
Media	8	16.7
Family members & relatives	2	4.2

Table (2) Demographic characteristics and medical history of the studied children (N= 48)

Characteristics	N	%
Child' age: : (in years)		
<3	8	16.7
3 - <6	10	20.8
6 – 12	26	54.2
>12	4	8.3
$\bar{x} \pm SD$ 7.64 ± 1.97		
Gender:		
Male	30	62.5
Female	18	37.5
Child birth order:		
First	8	16.7
Second	22	45.8
Third	10	20.8
More	8	16.7
Level of education:		
Before nursery	8	16.7
Nursery	10	20.8
Primary	26	54.2
Preparatory	4	8.3
Time of disease diagnosis:		
At birth	16	33.3
During the first year	17	35.4
After one year	15	31.3
Positive family history of cardiac / other chronic disease:		
Yes	22	45.8
No	26	54.2
Previous hospitalization:		
Yes	30	62.5
No	18	37.5
Length of stay at hospital: (postoperatively)		
≤ 5 days	32	66.8
> 5 days	16	33.2

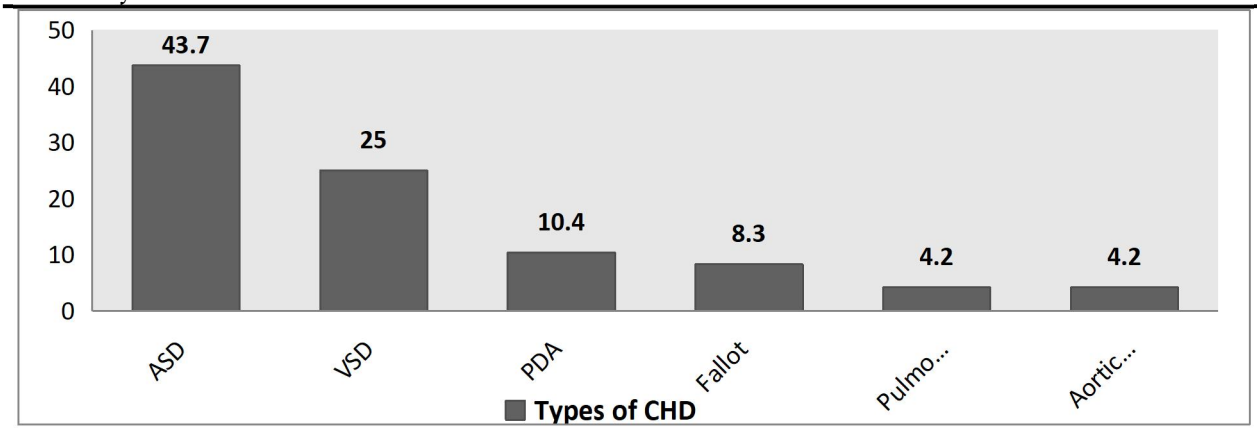

Fig (1) Types of congenital heart disease among studied child

Table (3) Total Knowledge Score of the studied mothers (N=48).

Mothers' knowledge	Pre		Post		Follow-up		Cochran's Q Test
	N	%	N	%	N	%	
Cardiac surgery:							
Satisfactory	8	16.7	43	89.6	41	85.4	11.300 0.000**
Unsatisfactory	40	83.3	5	10.4	7	14.6	
Daily home care:							
Satisfactory	4	8.3	41	85.4	40	83.3	10.928 0.001**
Unsatisfactory	44	91.7	7	14.6	8	16.7	
Overall knowledge:							
Satisfactory	6	12.5	43	89.6	42	87.5	12.334 0.000**
Unsatisfactory	42	87.5	5	10.4	6	12.5	

**** (High statistical significant differences P value <0.01).**

Table (4) Reported practice Scores about daily home care at pre-, post- and follow-up phases (n=48).

Reported practice	Pre		Post		Follow-up		Cochran's Q Test	P value
	n	%	N	%	n	%		
Incision Care:							6.002	0.003**
Satisfactory	2	4.2	42	87.5	39	81.3		
Unsatisfactory	46	95.8	6	12.5	9	18.7		
Methods to prevent infection:							7.003	0.002**
Satisfactory	1	2.1	43	89.6	41	85.4		
Unsatisfactory	47	97.9	5	10.4	7	14.6		
Medication administration							6.115	0.003**
Satisfactory	8	16.7	44	91.7	42	87.5		
Unsatisfactory	40	83.3	4	8.3	6	2.5		
Relief of pain:							4.773	0.008**
Satisfactory	2	4.2	39	81.3	39	81.3		
Unsatisfactory	46	95.8	9	18.7	9	18.7		
Child's Nutrition:							5.023	0.004**
Satisfactory	6	12.5	44	91.7	43	89.6		
Unsatisfactory	42	87.5	4	8.3	5	10.4		
Dental care:							7.043	0.002**
Satisfactory	20	41.7	48	100	48	100		
Unsatisfactory	28	58.3	0	0	0	0		
Activity after surgery:							8.444	0.000**
Satisfactory	1	2.1	45	93.7	44	91.7		
Unsatisfactory	47	97.9	3	6.3	4	8.3		
Immunization:							6.500	0.003**
Satisfactory	14	29.2	42	87.5	40	83.3		
Unsatisfactory	34	70.8	6	12.5	8	16.7		
Follow up appointments:							6.428	0.002**
Satisfactory	3	6.2	48	100	48	100		
Unsatisfactory	45	93.8	0	0	0	0		
Problems to Report to Doctor:							7.090	0.001**
Satisfactory	1	2.1	45	93.7	44	91.7		
Unsatisfactory	47	97.9	3	6.3	4	8.3		

**** (High statistical significant differences P value <0.01)**

Figure (2) Total reported practice scores among the studied mothers at pre, post and follow up phases. (N=48)

Table (5) Health outcomes of studied children post cardiac surgery (N=48).

Outcomes	At discharge		follow-up		Chi-square	P value
	N	%	N	%		
Wound *						
▪ Infection	7	14.6	32	66.7		
▪ edema	6	12.5	1	2.1		
▪ Pain	7	14.6	2	4.2	6.442	0.004**
▪ redness	34	70.8	10	20.8		
▪ discharge	10	20.8	2	4.2		
▪ None	8	16.7	1	2.1		
Cardiovascular system*						
▪ irregular heartbeat/Dysrhythmias	12	25	0	0	6.900	0.004**
▪ palpitation	14	29.2	6	12.5		
▪ None	22	45.8	42	87.5		
Respiratory system						
▪ shortness of breath,	20	41.7	1	2.0	5.113	0.007**
▪ rapid or labored breathing	6	12.5	0	0.0		
▪ None	22	45.8	47	98.0		
▪ **Gastrointestinal system***						
▪ Poor appetite	26	54.2	8	16.7		
▪ Nausea/ Vomiting	4	8.3	2	4.2		
▪ Constipation	2	4.2	0	0	4.887	0.009**
▪ Diarrhea	10	20.8	4	8.4		
▪ None	12	25	34	70.8		
Neurological system*						
▪ Dizziness	12	25	4	8.3		
▪ Fatigue	24	50.0	10	20.8	5.771	0.007**
▪ None	14	29.2	34	70.8		
Psychological complications*						
▪ pessimism	4	8.3	0	0		
▪ Weakness	8	16.6	2	4.2	5.513	0.009**
▪ Afraid from hospital and medical staff	18	37.5	6	12.5		
▪ None	30	62.5	36	75.0		
Sleep problems						
▪ Insomnia and nightmares	28	58.3	10	20.8	7.813	0.000**
▪ None	20	41.7	38	79.2		
Hospital readmission						
▪ Yes	8	16.6	2	4.2	9.034	0.000**
▪ No	38	83.4	46	95.8		

***more than one answer, ** (High statistical significant differences P value <0.01).**

Table (6) Correlation between Total knowledge and Total reported practices scores at pre, post and follow up phases.

Variables		value
Total knowledge and practice pre	0.498	.004**
Total knowledge and practice post	0.577	.002**
Total knowledge and practice follow-up	0.602	.000**

Pearson's correlation coefficient (**) Highly significant at p<0.01

Interpretation of r

Weak (0.1-0.24) Intermediate (0.25- 0.74) Strong (0.75-0.99)

Table (7): Multiple Linear regression model for mothers' knowledge (N=48)

		Unstandardized Coefficients	Standardized Coefficients	T	P. value
		B	B		
Age		.249	.197	4.012	.007**
Occupation (Worker)		.060	.005	0.670	.083
Education level (high)		.270	.212	6.261	.003**
Residence (Rural)		-.060	.017	0.233	.088
Source of information (Health personnel)		.177	.104	2.366	.040*
Parent consanguinity: (Yes)		.046	.010	0.900	.061
Model	**R^2**	**Df.**	**F**	**P. value**	
Regression	**0.48**	5	10.904	.000**	

(**) Highly significant at p< (0.001). a. Dependent Variable: Mothers' knowledge

b. Predictors: (constant): Age, Occupation (Worker), Education level (High), Residence (Rural), Source of information (Health personnel), Parent consanguinity: (Yes)

Table (8): Multiple Linear regression model for mothers' reported practice (N=48)
(**) Highly significant at p< (0.001).

		Unstandardized Coefficients	standardized Coefficients	T	P. value
		B	B		
Age		.205	.136	3.012	.015*
Occupation (Worker)		.182	.125	2.660	.034*
Education level (High)		.214	.189	5.506	.004**
Residence (Rural)		-.073	.015	0.570	.098
Source of information (Health personnel)		.190	.123	2.763	.031*
Parent consanguinity: (Yes)		.072	.016	0.537	.064
Model	**R^2**	**Df.**	**F**	**P. value**	
Regression	**0.46**	5	8.444	.004**	

a. Dependent Variable: Mothers' knowledge
b. Predictors: (constant): Age, Occupation (Worker), Education level (High), Residence (Rural), Source of information (Health personnel), Parent consanguinity: (Yes)

Discussion

As regards the demographical data of the studied mothers, it was discovered that approximately fifty percent of the mothers were in the age group of thirty to forty years. This finding goes in line with **EL-Gendy et al., (2018),** who found that half of the studied mothers were in the same age group. Regarding educational level, more than half of mothers continued their secondary or diploma education. A similar result was noted in another study by **Abdel-Salam and Mahmoud (2018),** who revealed that less than half of the study group possessed a technical diploma.

According to the current study, two-thirds of the studied mothers were housewives. These results are in concurrence with those of **Mahmoud et al. (2020)** who stated that the majority of mothers were housewives. Variables such as mothers' age, educational level, and source of information had significant positive predictors on mothers' knowledge ($p < 0.05$). On the same way, **Pramila & Chandni (2017)** demonstrated that mothers' age, educational level, residence, and source of information were significantly correlated with their level of knowledge ($p < 0.05$).

Concerning the characteristics of the studied children, it was revealed that more than half of the studied children were aged 6-12 years; this finding goes in line with **Raj et al. (2019).** Males constituted three fifths of the sample size. A similar male preponderance was reported by **Mahmoud et al. (2020).** As regards type of Congenital heart disease (CHD), more than two fifth and one quarter of the studied children were diagnosed as ASD and VSD respectively. This finding was incongruent with **Abdel-Salam & Mahmoud (2018),** who found that 60%, 40% of the studied children suffered from ASD and VSD, respectively. These findings were related to the fact that the most common CHD subtypes worldwide are ASD and VSD, which

represent about one third of CHD **(Baumgartner et al., 2021).**

The current study clarified that prior to the implementation of the guiding program, more than two thirds of the studied mothers had an unsatisfactory knowledge score about open heart surgery (OHS). This may be due to inadequate explanations from health care providers and a lack of health education about cardiac surgery itself. On the other hand, immediately post-program implementation, most of the group was satisfied with their knowledge. This finding was matched with **Ibrahim et al. (2018),** who found that more than a quarter of studied sample had poor knowledge about OHS in the pretest; while this percent improved in posttest.

The results of the present study revealed highly statistically significant improvements in total knowledge scores about cardiac surgery and routine home care (P 0.01), with two-thirds of the group having satisfactory knowledge scores following the guiding program application (P 0.01). These variations may be due to the program nature, objectives, content and the interactive learning methods utilized to impart knowledge in addition to telephone follow- up calls to remind mothers about the next sessions and address any issues about routine home care practices. Similar findings were reported by **Elsobky &Amer (2018),** who illustrated that the majority of the studied group had inadequate total knowledge of open heart surgery before program implementation but had satisfactory knowledge post- and follow-up program implementation.

The current study showed highly statistically significant improvements in all items of mothers' practices in caring for their children after discharge, such as incision care, medication administration, pain management, child's nutrition, dental care and activity throughout the study phases (P = 0.001). These findings are in harmony with **Hussein et al. (2021),** who revealed highly statistically significant differences in mothers' actual practices after the family-center Care intervention.

According to **Elsobky and Amer (2018),** the pre-discharge program implementation led to an improvement in mothers' stated practices. This finding is compatible with the present study since there were significant differences between the pretest and posttest in mothers' total reported practice related to daily home care. These differences are due to the continuous training provided to mothers on how to care for their children at home following open heart surgery.

In a study conducted by **Sabaq and Abd el sadak (2019**), it was clarified that one month and three months following the program's implementation, all complications of children after discharge were lower in the study group than they were in the controls. These findings were matched with the current study, as highly statistically significant improvements in all items of children' health outcomes were observed, with a marked reduction in postoperative symptoms at one month after discharge. These findings ascertain the strong effect of guiding program application and follow up appointments on enhancing children' health outcomes.

Additionally, **Liu et al. (2019),** who studied post-operative health perceptions and outcomes following cardiothoracic surgery in India, reported that post-discharge one month later incidence of complications was significantly lower for the care companion program group compared to the standard of care group.

The current study demonstrated a strong positive correlation between mothers' reported practice for child care and their overall knowledge scores. National and international studies supported our results (**Abdel-Salam &Mahmoud, 2018; Wangsawat eal., 2019; Coban & Ortabag, 2022)** and stressed the extremely significant positive association between parents' knowledge and level of practice about care for their children following discharge. On the contrary, **Mohamed et al. (2022)** illustrated a non-statistically significant relationship between the mother's knowledge and practices (P >0.05).

From Our point of view, training mothers to provide care for their children post-cardiac surgery is crucial for improving knowledge, reported practices, children' health outcomes as well as decreasing postoperative problems. **Ghonaem et al., (2018)** supported our point

of view and found evidence that discharge programs play an important role in improving knowledge and decreasing the incidence of post-operative problrems. The same results were reached by **Shahmoradi et al. (2022),** who clarified that the use of educational approaches before and after heart surgery can have significant effects on improving patients knowledge, satisfaction, and quality of care while also reducing postoperative complications.

Conclusion

It might be concluded that a comprehensive guiding program has a profound effect on improving mothers' knowledge and reported practices about home care as well as enhancing children's health outcomes after cardiac surgery; with a decline in postoperative complications.

Recommendations

- Continuous, repetitive discharge instructions for parents about home care of their children after surgery is mandatory to enhance fast recovery and prevent complications.
- Designing suitable booklets and written leaflets containing basic knowledge about open heart surgery and home care management should be available and distributed in outpatient clinics.
- Future researches and surveys are recommended for broad number of population to detect the most affected areas and the real depth of the problem.

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