

Assessment of Informal Caregivers' Knowledge and Practice Regarding Discharge Plan for Post Cardiac Catheterization Patients

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Abstract

Background: Discharge plan is a key element in patient with cardiac catheterization care. **Aim:** This study aimed to assess the informal caregivers' knowledge and practice regarding discharge plan for post cardiac catheterization patients. **Research design:** Descriptive research was used in this study. **Sample:** Convenience sample of informal caregivers having post cardiac catheterization patients was included 100 informal caregivers. **Setting:** It was conducted in cardiac catheterization Department in Tamia general hospital in El-Fayoum governorate, Egypt. **Tools:** One tool included four parts: **First:** Sociodemographic data for informal caregivers and patients, **second:** Past & current medical history of patients, **third:** Informal caregivers' knowledge, **fourth:** Informal caregivers' reported practice. **Results:** The study result revealed that, 63.0 % of the studied sample had poor knowledge regarding discharge plan for post-cardiac catheterization patients. 65.0 % of the studied sample had unsatisfactory with total reported practice regarding discharge plan for post-cardiac catheterization patients. **Conclusion:** The current study concluded that (63 %) less than two third of the studied informal caregiver had poor total knowledge about discharge plan for post-cardiac catheterization patients, also (65%) two third of them had unsatisfactory total reported practices regarding discharge plan for post-cardiac catheterization patients. There is statistically significant relation between studied informal caregivers' sociodemographic data and their knowledge, and reported practices regarding discharge plan for post-cardiac catheterization patients. **Recommendations:** Apply health education program for informal caregiver and design booklets about discharge plan for post cardiac catheterization patients to prevent further complications.

Key words: Assessment, Cardiac Catheterization, Discharge Plan, Informal Caregivers knowledge and Practice.

Introduction

Cardiac catheterization is a procedure in which a thin, flexible tube (catheter) is guided through a blood vessel to the heart to diagnose or treat certain heart conditions, as clogged arteries or irregular heartbeats. It is a test or treatment for certain heart or blood vessel problems. The tube is guided through a blood vessel to the heart. Cardiac catheterization gives important details about the heart muscle, heart valves and blood vessels in the heart. During the procedure, a physician can test the pressures in the heart or do treatments as opening a narrowed artery. Sometimes a piece of heart tissue is removed for examination (Hassan et al., 2023).

Cardiac catheterization is a treatment used to diagnose and treat several heart conditions like arrhythmias, angina, or cardiac valve problems. Cardiac catheterization may be done during the diagnosis or treatment of coronary artery disease, congenital heart disease, heart failure, and microvascular heart disease. Cardiac catheterization had several complications that embrace the following infection, injury and pain at sheath insertion site, blood clots and harming urinary organ may occur because of the distinction dye that common in kidney disease and patients with diabetes mellitus (Garcia-Pachon et al., 2021).



The age-adjusted average rate of cardiac catheterization in all over the world among men ranged from 404.9 to 638.1 per 100 000 population aged over 20 years. Among women, the average rate ranged from 171.8 to 314.0 per 100 000. Over 1,000,000 cardiac catheterizations (CC) are performed annually in the United States. There is a small risk of complication that has persisted despite advances in technology (*Szirt et al., 2023*). In Egypt, the prevalence of cardiac catheterization in Egypt varies across different regions of the country. According to a study on hospitalized heart failure patients, the utilization of right cardiac catheterization was reported to be very rare, at less than 1% across different regions of Egypt. On the other hand, coronary angiography was utilized in a small percentage of patients, ranging from 15 % in Cairo to 3 % in Upper Egypt (*Faraoni & Kruisselbrink, 2023*).

Discharge planning is a key element in patient care. It involves outlining the routine and health needs that expected upon exit from the facility, which is a link between functioning in the community and hospitalization. Discharge plan after cardiac catheterization include instructions about taking medications, activity restrictions, healthy diet and nutrition, puncture site and follow-up appointments. It helps the patients to communicate with health care professionals and primary care providers about the best way to manage their chronic needs after leaving the hospital (*Jarelnape, 2020*).

Informal caregivers, means family caregivers, are people who give care to family or friends usually without payment. An informal caregiver gives care, generally in the home environment, for an aging parent, spouse, other relative, or unrelated patient, or for an ill, or disabled patient. These tasks may include transportation, grocery shopping, housework, preparing meals, giving assistance with getting dressed, getting out of bed, help with eating, and incontinence (*Bell et al., 2019*).

Awareness of informal caregiver means the state of being conscious of something. More specifically, It is the ability to directly know and perceive, to feel, or cognizant of events. Benefits of awareness: it gives the power to influence outcomes; it helps to become better decision-makers; it gives more self-confidence as a result, communicate with clarity and intention; it allows to understand things from multiple perspectives; it frees from assumptions and biases; it helps to build better relationships; it gives greater ability to regulate emotions; and it decreases stress (*Betz et al., 2023*).

Community Health Nurse (CHN) play an important role in provide detailed education to informal caregivers about the cardiac catheterization procedure, what to expect before, during, and after the procedure, potential complications, and how to provide care at home post-procedure. Informal caregivers may experience anxiety and stress related to the procedure and their loved one's health. Nurses can offer emotional support, reassurance, and coping strategies to help them manage their emotions effectively. Nurses can teach informal caregiver's practical skills such as monitoring vital signs, recognizing signs of complications, administering medications, wound care, and assisting with activities of daily living as needed. (*khan et al., 2020*).

Significance of the study:

Heart diseases are responsible for 50% of cardiovascular death bed globally. Cardiac catheterization is one of the most widely performed cardiac procedures. In the United States, more than one million cardiac catheterization procedures are performed annually (*Manda & Baradhi, 2018*). In Egypt, 2019 the number of cardiac catheterization interventions reached 106.165 cardiac catheterization operations, out of a total of 239.890 operations that have been performed since the beginning of the initiative until yesterday, representing 46% of the total operations, and the diagnostic catheterization rate reached 62% of the total catheterization operations, and 38% Angioplasty and stenting (*Abdel Salam, 2019*).

Mohamed et al., (2021) indicated that, in Egypt; 17% of emergency units is chest pain complain. 8-10% of them need catheterization. The need for cardiac catheterization has been increased. It is a less invasive safe procedure with a high profit. It is reducing hospital stay, wait time, and list for diagnosis and treatment. Therefore, the aim of this study is to assess the awareness of informal caregivers regarding discharge plan for post cardiac catheterization patients.

Several studies concluded that nursing led intervention seems to improve various aspects of post cardiac catheterization problems as self-management, healthy-heart lifestyle modifications, psychological well-being and quality of life. develop a structured post cardiac catheterization discharge plan with enhanced responsibilities assigned to community health nurse in order to improve patients' quality of life and satisfaction in the post-discharge period (*Zhang & Qi, 2021*).

**Aim of the Study**

This study aimed to assess the informal caregivers' knowledge and practice regarding discharge plan for post cardiac catheterization patients through the following objective:

- 1-Assessing informal caregivers' knowledge about discharge plan for patients post cardiac catheterization.
- 2-Evaluating informal caregivers' reported practice about discharge plan for patients post cardiac catheterization.

Research Question:

- 1- What is informal caregivers' level of knowledge about discharge plan for patients post cardiac catheterization?
- 2- What is informal caregivers' level of practice regarding discharge plan for patients post cardiac catheterization?

Subject and Methods**Research design:**

A descriptive research design was conducted to achieve the study.

Setting:

This study conducted at Cardiac Catheterization Department in Tamia General Hospital affiliated to Ministry of Health and Population (MOHP) which is located in El-Fayoum governorate. It provides free services for rural and urban areas at El-Fayoum governorate. The department includes three rooms for the checkup, reception for the clients, room for oxygen pressure and two rooms for post operative every room consisted from bath room, two beds, nightstand, table and desk drawer. It includes three physician and ten nurses.

Sampling:

Convenience sample of informal caregivers having post cardiac catheterization patients. the study will include (100) informal Caregivers from (132) that represent the flow rate in the previous year 2021-2022 "according to the following equation" attended to (Tamia General Hospital) at EL Fayoum district.

$$n = \frac{N}{1 + N e^2}$$

n = sample size

N = total population

e = error margin

$$n = \frac{132}{1 + (132)(0.05)^2} = 100$$

Tools for data collection:

Data was collected using the following one tool:

Tool: A structured interviewing sheet: was used in the study, it's developed by investigators after reviewing the national and international related literature and contains four parts:

Part I: Demographic characteristics for both informal caregivers and patients it included 2 items:

A-Demographic characteristics of informal caregivers consisted of 8 items such as: age, sex, level of education, place of residence.

B-Demographic characteristics of patients consisted of 6 items such as: age, sex, level of education, marital status.

Part II: Past and present medical history of patients consisted of 8 close end questions such as: do you suffer from chronic diseases, if the answer is yes, have you had any previous surgery, if the answer is yes, duration of the disease.

Part III: Informal caregiver's knowledge about discharge plan for post cardiac catheterization patients consisted of 22 close end questions such as: meaning of cardiac catheterization, a catheter in which a (thin tube inserted into the body) through a major artery, which is usually located in the groin, a procedure in which catheters are inserted into the arteries of the heart by using balloons and installing stents, types of cardiac catheterization.

Scoring system:

Each statement was assigned score according to informal caregiver's response were: complete correct was scored 2 grades. Incomplete correct was scored 1 grade and incorrect or don't know was scored 0. Total score were 36 grades from 18 questions. The total score each item summed up and then converted into percent score **as the following:**

- **Good knowledge** ($\geq 75\%$) = ≥ 33 grades, was considered high score.
- **Average knowledge** ($50 - < 75\%$) = $22 - < 33$ grades, was considered moderate score.
- **Poor knowledge** ($< 50\%$) = < 22 grades, was considered poor.

Part IV: Informal caregivers' reported practice regarding discharge plan for patient after cardiac catheterization consisted of 5 items:

A- Informal caregiver's reported practice about nutrition to discharge plan for patient after cardiac catheterization included 5 closed end questions as: having fluids and drink water from 6 to 8 glasses per day, avoid foods that are high in salt and fat, eat fruits and vegetables to increase vitamins.

B- Informal caregiver's reported practice about site of sheath insertion to discharge plan for patient after cardiac catheterization included 9 closed end questions as: catheter insertion site should be washed at least once a day with soap and water, the sheath insertion site is covered with an adhesive bandage, frequently evaluate the sheath insertion site for bleeding.

C- Informal caregiver's reported practice about patient activities to discharge plan after cardiac catheterization included 7 closed end questions as: showering is allowed first 24 hours after cardiac catheterization, or according to the physician's instructions, water is allowed to reach site of sheath insertion first 24 hours after the procedure, the patient does not drive the car for at least 24 hours after procedure.

D- Informal caregiver's reported practice about cases that require contacting a physician to discharge plan after cardiac catheterization included 8 closed end questions as: bleeding from the catheter insertion area, increased or irregular heartbeat, chest pain, frequent sweating or vomiting.

E- Informal caregiver's reported practice about vital signs and medications to discharge plan after cardiac catheterization included 9 closed end questions as: explain how to assess vital signs at home, normal and abnormal vital signs, clarification of the specified daily doses of medicines, teaching how to prepare and give medication to the patient.

Scoring system:

Each statement was assigned score according to informal caregivers' response were "Done", "Not Done", and were scored 2 and 1, respectively. Total score were 76 grades for 38 items. The scores of items summed up and then converted into percentage score **as the following:**

- (> 60) was considered satisfactory = ≥ 46 grades.
- (≤ 60) was considered unsatisfactory < 46 grades.

Tool validity and Reliability:

A) Content validity:

The validity of the tool was tested through five experts in the community health nursing from Faculty of Nursing - Helwan University to review the relevance of the tools for clarity, relevance, comprehensiveness, understanding and applicability.

B) Tool reliability:

The study tools were tested by the pilot subject's reliability for calculating Cronbach's Alpha which was 0.894 for the studied sample knowledge about the discharge plan for post cardiac catheterization patients, and 0.912 for the studied sample reported practice about discharge plan for post cardiac catheterization patients.

Ethical Considerations:

An official permission to conduct the proposed study obtained from the one Scientific Research Ethics Committee in Faculty of Nursing Helwan University. Participation in the study is voluntary and subjects given complete full information about the study and their role before signing the informed consent. The ethical consideration included explaining the purpose and nature of the study, stating the possibility to withdraw at any time, confidentiality of the information where it not be accessed by any other party without taking permission of the participants. Ethics, values, culture and beliefs respected. **Operational Item:**

The study completed passed through different phases included preparatory phase, pilot study and filed work phase.

Preparatory phase:

A reviewing of past and current literature covering the various aspects of the problem was done using books, articles, periodicals, magazines and network about informal caregivers' knowledge and reported practice regarding discharge plan for post cardiac catheterization patients.

Pilot Study:

A pilot study has been conducted to test the clarity, applicability and understand ability of the tool. It has been conducted on (10%) of the sample equal (10 informal caregivers), no modification done. The participants of the study were included in the main study sample.

Field work:

- An official letter issued from the dean of Faculty of Nursing Helwan University, and directed of Tamia General Hospital which is located in El-Fayoum governorate including the aim of the study to obtain permission after establishing a trustful relationship, each subject interviewed individually by the investigators to explain the study purpose.
- Data collected within 6 months from June to November 2022 two days /week (Tuesday- Wednesday) from 9am -2pm, till the needed sample completed, interview of informal caregiver, informed consent obtained from informal caregiver after the investigators introduce himself for each informal caregiver, then explain the purpose of the study to assess knowledge, and reported practice of informal caregiver about discharge plan for post cardiac catheterization patients. Study collected through structure face to face interview and the entire tool filled by the investigators.
- The investigators utilize one tool, was need 20 -30 minutes and meeting the informal caregiver two days per week (Tuesday- Wednesday) from 9am -2pm.
- The investigators taken \circ informal caregiver each week, total number of informal caregivers = 100 informal caregivers.

Administrative Item:

An official Permission was obtained from Dean of Faculty of Nursing Helwan University and Approval from the Fayoum Governorate Health Directorate, Approval from the Health Administration in Fayoum Governorate, and official Permission from directed of Tamia General Hospital which is located in El-Fayoum governorate in cardiac catheterization department to conduct the study. This letter included a permission to collect the necessary data and explain the purpose and nature of the study.

Statistical Item

The collected data from the studied sample was revised, coded and entered using personal computer (PC). Computerized data entry and statistically analyzed using SPSS program (Statistical Package for Social Science) version 24. Data were presented using descriptive statistics in the form of frequencies and relative percentages. Chi square test (χ^2) was used to calculate difference between qualitative variables through this equation:

Where:
 Σ =sum O= observed value $\chi^2 = \sum \frac{(O - E)^2}{E}$ E= expected P=.0001

Degrees of Significance of the results were:

- Non-Significant (NS) if $p > 0.05$.
- Significant (S) if $p < 0.05$.
- High Significant (HS) if $p < 0.01$.

Result:

Table (1): Frequency Distribution of the Studied Informal Caregiver according to Demographic Characteristics (n=100).

Demographic Characteristics	The studied Informal Caregiver	
	No.	%
Age		
From 18 to < 30 years	49	49.0
Over 30 to 42 years	35	35.0
More than 42	16	16.0
Mean ± SD		25.4 ± 4.1 years
Gender		
Male	47	47.0
Female	53	53.0
Education level		
Read and write	10	10.0
Primary education	6	6.0
Secondary education	20	20.0
University education and more	64	64.0
Place of residence		
Urban	50	50.0
Rural	50	50.0
Occupation		
Work	87	87.0
Not work	13	13.0
Family income		
Enough	64	64.0
Not enough	36	36.0
Relationship with the patient		
Father / mother	6	6.0
Husband / wife	16	16.0
Son/daughter	78	78.0

Table (1): Shows that, the mean age of studied informal caregiver was 25.4 ± 4.1 years. Also, 64.0 % of the studied informal caregiver’s educational level was university education or more and 53.0 % of studied informal caregiver’s sex was female. Moreover, 87.0 % of studied informal caregiver’s occupation was work. Additionally, 64.0 % of studied informal caregiver’s monthly income was enough, and 78.0 % of studied informal caregiver’s relationship with the patient was son/daughter.

Table (2): Frequency Distribution of Patients according to Demographic Characteristics (n=100).

Patients’ Demographic Characteristics	The studied sample	
	No.	%
Age		
From 18 to < 30 years	6	6.0
Over 30 to < 42 years old	---	---
Over 42 to < 5 ^٤ years old	37	37.0
More than 5 ^٤ years	57	57.0
Mean ± SD		56.4 ± 3.5 years
Sex		

Male	43	43.0
Female	57	57.0
Education level		
No read and write	3	3.0
Read and write	24	24.0
Primary education	20	20.0
Secondary education	47	47.0
University education and more	6	6.0
Marital Status		
Married	54	54.0
Divorced	5	5.0
Widowed	41	41.0
Residence (caregiver accommodation)		
With the patient	73	73.0
Close to the patient	21	21.0
Far from the patient	6	6.0
Occupation		
Work	49	49.0
Not work	51	51.0

Table (2): Shows that, the mean age of patient was 56.4 ± 3.5 years. Also, 47.0 % of the patient’s educational level was secondary education and 57.0 % of patient’s sex was female. Moreover, 51.0 % of patient’s occupation was not work. Additionally, 54.0 % of patient’s marital status was married, and 73.0 % of patient’s residence was with the patient.

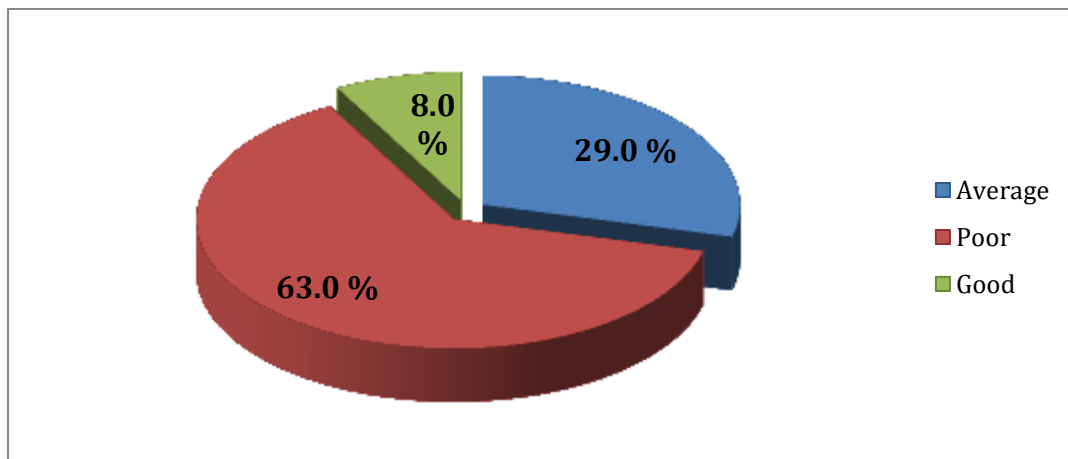


Figure (1): Percentage Distribution of Total Knowledge among Studied Informal Caregiver regarding Discharge Plan for Post-Cardiac Catheterization Patients (n=100).

Figure (1): Shows that, 63.0 % of the studied informal caregiver had poor knowledge regarding discharge plan for post-cardiac catheterization patients. Also, 29.0 % of them had average knowledge regarding discharge plan for post-cardiac catheterization patients. While, 8.0 % of them had good knowledge regarding discharge plan for post-cardiac catheterization patients.

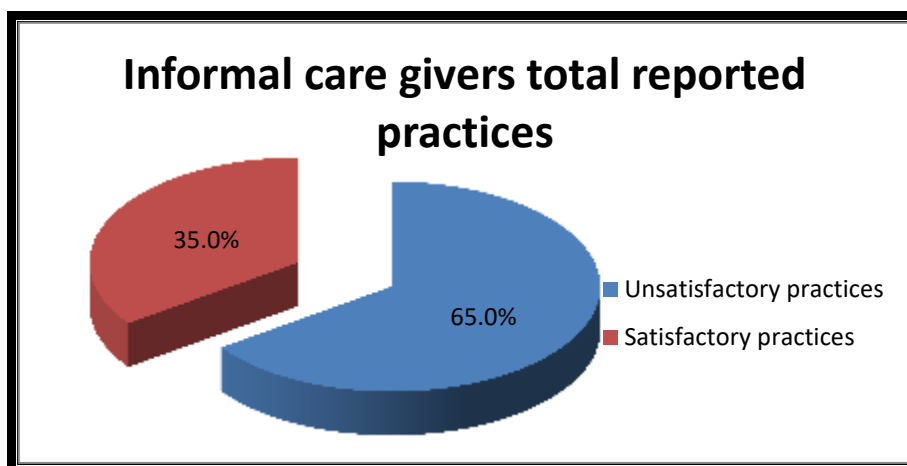


Figure (2): Percentage Distribution of Informal Caregivers Total Reported Practices regarding Discharge Plan for Post-cardiac Catheterization Patients (n=100).

Figure (2): Shows that, 65.0 % of the studied informal caregiver had unsatisfactory with total reported practice regarding discharge plan for post-cardiac catheterization patients. While, 35.0 % of them had satisfactory with total reported practice regarding discharge plan for post-cardiac catheterization patients.

Table (3): Relation between Studied Informal Caregiver’s Demographic Characteristics and their Total Knowledge (n=100).

Demographic characteristics	Total informal caregiver knowledge						χ^2	P
	Poor n=63		Average n=29		Good n=8			
	No.	%	No.	%	No.	%		
Age								
From 18 to < 30 years	40	63.5	6	20.7	3	37.5	30.23	0.000
Over 30 to 42-years	20	31.7	10	34.5	5	62.5		
more than 42	3	4.8	13	44.8	0	0.0		
Sex								
Male	30	47.6	10	34.5	7	87.5	18.57	0.000
Female	33	52.4	19	65.5	1	12.5		
Education level								
Read and write	5	7.9	3	10.3	2	25.0	41.08	0.000
Primary education	6	9.5	0	0.0	0	0.0		
Secondary education	15	23.8	0	0.0	5	62.5		
University education	37	58.7	26	89.7	1	12.5		
Marital Status								
Married	47	74.6	10	34.5	0	0.0	39.63	0.000
Single	16	25.4	19	65.5	8	100.0		
Residence								
Urban	50	79.4	0	0.0	0	0.0	28.9	0.000
Rural	13	20.6	29	100.0	8	100.0		
Job or profession								
Work	60	95.2	20	70.0	7	87.5	11.01	0.004
Not work	3	4.8	9	30.0	1	12.5		

Family income								
Enough	60	95.2	4	13.8	0	0.0	36.23	0.000
Not enough	3	4.8	25	86.2	8	100.0		
Relationship with the patient								
Father / mother	6	9.5	0	0.0	0	0.0	22.81	0.000
Husband / wife	10	15.9	6	20.7	0	0.0		
Son/daughter	47	7.5	23	79.3	8	100.0		

>0.05 Non significant <0.05* significant <0.001

Table (3): Shows that, there was highly statistically significant relation between studied informal caregiver's, total knowledge and all items of socio-demographic characteristics, where (P = < .0001).

Table (4): Relation between Studied Informal Caregiver's Demographic Characteristics and their Total Reported Practice (n=100).

Demographic characteristics	Informal caregiver's practices				χ^2	P
	Unsatisfactory n=65		Satisfactory n=35			
	No.	%	No.	%		
Age						
From 18 to 30 years	40	61.5	9	25.7	3.99	0.136
Over 30 to 42-years	20	30.8	15	42.9		
more than 42	5	7.7	11	31.4		
Sex						
Male	40	61.5	7	20.0	0.048	0.827
Female	25	38.5	28	80.0		
Education level						
Read and write	10	15.4	0	0.0	4.62	0.202
Primary education	6	9.2	0	0.0		
Secondary education	20	30.8	0	0.0		
University education and more	29	44.6	35	100.0		
Marital Status						
Single	23	35.4	20	57.1	5.09	0.02
Married	42	64.6	15	42.9		
Place of residence						
Urban	50	76.9	0	0.0	0.003	0.95
Rural	15	23.1	35	100.0		
Occupation						
Work	65	100.0	22	62.9	1.89	0.169
Not work	0	0.0	13	37.1		
Family income						
Enough	29	44.6	35	100.0	2.57	0.108
Not enough	36	55.4	0	0.0		
Relationship with the patient						
Father / mother	6	9.2	0	0.0	3.45	0.178
Husband / wife	0	0.0	16	45.7		
Son/daughter	59	90.8	19	54.3		

>0.05 Non significant <0.05* significant <0.001

Table (4): Shows that, there was highly statistically significant relation between studied informal caregiver's total reported practice and all items of socio-demographic characteristics, where (P = < .0001).

Table (5): Correlation between Total Knowledge, and Total Reported Practices of Informal Caregiver (N=100).

Knowledge & reported practices	Changes of scores of total knowledges, and reported practices			
	knowledge		Reported Practices	
	r	p	r	p
knowledge	0.225	0.000	0.497	0.000

>0.05 Non significant <0.05* significant <0.001

Table (5): Shows that, there was a significant positive correlation ($r = 0.497, p < 0.001$) between changes in total knowledge and changes in practices among informal caregivers. This suggested that as caregivers' knowledge improves or declines, their reported practices.

Discussion:

Cardiac catheterization is a treatment used to diagnose and treat several heart conditions like arrhythmias, angina, or cardiac valve problems. Cardiac catheterization done during the diagnosis or treatment of coronary artery disease, congenital heart disease, heart failure, and microvascular heart disease. Cardiac catheterization had several complications that embrace the following infection, injury and pain at sheath insertion site, blood clots and harming urinary organ may occur because of the distinction dye that common in kidney disease and patients with diabetes mellitus (*McGregor & Palokas, 2023*). Discharge planning is a key element in patient care. It involves outlining the routine and health needs that expected upon exit from the facility, which is a link between functioning in the community and hospitalization. Discharge plan after cardiac catheterization include instructions about taking medications, activity restrictions, healthy diet and nutrition, puncture site and follow-up appointments. It helps the patients to communicate with health care professionals and primary care providers about the best way to manage their chronic needs after leaving the hospital (*Obafemi et al., 2023*).

Regarding to demographic characteristics of the studied informal caregiver. The present study findings related that mean age of informal caregivers were 25.4 ± 4.1 years. While the mean age of patients were 56.4 ± 3.5 years. This result is similar to a study conducted by *Bartoletti et al., (2022)* who conducted a study in South Thames in London about "Same-day discharge in selected patients undergoing atrial fibrillation ablation in South Thames". They found that the mean age of informal caregiver was 25.18 ± 4.95 years for the study group and the mean age of patients was 54.9 ± 3.7 years. As well it is nearly consistent with *Bjørnnes et al., (2021)* who conducted a study in USA about " Experiences of informal caregivers after cardiac surgery", they represented that mean age of informal caregivers was 26.17 ± 6.8 years, and the mean age of patients was 55.77 ± 5.44 years.

Concerning the level of education of studied informal caregiver, the current study result revealed that, two third of the studied informal caregiver had university education and more, and less than half of patients had secondary education. This result in the same line with *Hussein et al., (2022)* who carried out a study conducted in Egypt about " Nurses' Knowledge and Practice toward Post Cardiac Catheterization Patients' Safety ", they found that 66.1 % of studied sample had university education and more and 44.5 % of patients had secondary education.

Regarding the studied informal caregiver's occupation, the current study revealed that, the majority of studied informal caregiver were working, and the nearly half of patients were working. This finding was in accordance with *Natha et al., (2021)* who conducted a study in Canada about " Patient Experience After Risk Stratification and Follow-up for Acute Kidney Injury After Cardiac Catheterization " they found that, the 83.2 % of studied sample and patients were working. From the investigators point of view, the high standard of living and prices in Egypt leads to the need for work to provide the family's requirements.

Concerning the place of residence of studied informal caregiver, the current study result revealed that, nearly half of studied informal caregiver was live in urban area. This result in the same line with *Rajendra et al., (2021)* who carried out a study conducted in Pakistan about " Prospective implementation of a same-day discharge protocol for catheter



ablation of paroxysmal atrial fibrillation ", they found that 58.5 % of studied sample had live in urban area. From the investigators point of view, urban areas typically offer a wide range of amenities and services as healthcare facilities, educational institutions, shopping centers, entertainment venues, and cultural attractions. The convenience of having these services nearby can be a major draw for urban living.

Regarding the studied informal caregiver and patient's gender, the present study indicated that more than half of studied informal caregiver and patients were female. These results agree with **Gill et al., (2023)** who conducted a study in Saudia Arabia, studied about " Post-Discharge Problems in Cardiac Surgery Patients", they found that, 52.6 % of the studied sample were female and 54.1 % of patients were female. From the investigators point of view, females generally have smaller blood vessels and a smaller heart size compared to males, and hormonal differences between males and females, particularly in estrogen levels, may impact the blood vessels of the heart.

Concerning the marital status of studied informal caregiver and patients, the current study result revealed that, more than half of studied informal caregiver and patients were married. This result in the same line with **Sania et al., (2022)** who carried out a study conducted in Karachi about " The Impact of Educational Training on Nurses to improve knowledge about Practices Regarding Patients Safety after Cardiac Catheterization ", they found that 58.5 % of studied sample had married and 57.3 % of patients had married. From the investigators point of view, many people seek companionship and emotional support as they age. Marriage can provide a stable and enduring relationship that fulfills these needs.

The following paragraphs Answered research Q 1: What is informal caregivers' level of knowledge about discharge plan for patients post cardiac catheterization?

Regarding studied informal caregivers' total knowledge, the current study revealed that, less two third of them had poor knowledge, less than two third had average knowledge and less than tenth of them had good knowledge, this result agrees with **Moukhtar et al., (2021)** who conducted a study in Egypt about "Effect of Caregivers Training Program on Stroke Patients' Self-Efficacy.", they found that, 7.2 % of the parents had good total knowledge. Also, 58.9 % had poor knowledge and 30% of them had average knowledge. From the investigators point of view, healthcare professionals might not effectively communicate discharge instructions to informal caregivers, assuming that the patient will relay the information. However, patients may forget or misunderstand the instructions themselves, leading to gaps in knowledge among caregivers.

The following paragraphs Answered research Q 2: What are informal caregivers' reported practice regarding discharge plan for patients post cardiac catheterization?

Regarding studied informal caregivers' total reported practices, the current study revealed that, nearly two third of them had unsatisfactory and nearly one third of them had satisfactory, this result agrees with **Ibrahim & Abd Elkhair, (2023)** who conducted a study in Egypt about "Effect of mothers' empowerment guildelines about caring for children with cardiac catheterization on their knowledge and children selected outcomes.", they found that, 60.5 % of the parents had unsatisfactory total reported practices. Also, 35.9 % had satisfactory total reported practices. From the investigators point of view, the prospect of a medical procedure like cardiac catheterization can cause fear and anxiety in some individuals. Fear of the procedure itself, potential complications, or the results can deter people from undergoing the practice. Some people may not fully understand the purpose, benefits, and importance of cardiac catheterization in diagnosing or treating heart conditions. A lack of awareness or understanding of the procedure may lead individuals to avoid.

Regarding to relation between studied informal caregiver's socio demographic characteristics and their total knowledge, the current study revealed a highly statistically significant between studied informal caregivers' age, educational levels occupation and their total knowledge scores. This result agrees with the study done by **Shokr, et al., (2023)** who conducted a study in Egypt about "Access to emergency care in Egypt: Tiered health care and manifestations of inequity.", they found that, a statistically significant relation between parents' age, level of education and occupation, and their total knowledge scores. From the investigators point of view, there may be limited public awareness campaigns or educational initiatives that specifically focus on increasing knowledge about cardiac catheterization. Health education efforts often prioritize more common or well-known conditions, and the targeted dissemination of information on cardiac catheterization may be limited.

Regarding to relation between studied informal caregiver's socio demographic characteristics and their total reported practices, the current study revealed a highly statistically significant between studied informal caregivers' age, educational

levels occupation and their total knowledge scores. This result agrees with the study done by **Faraoni & Kruisselbrink, (2023)** who conducted a study in Indonesia about “Implementation and Postoperative Management of Continuous Adductor Canal Catheters for Total Knee Arthroplasty to Reduce Surgical Backlog Related to the COVID-19 Pandemic”, they found that, a statistically significant relation between parents’ age, level of education and occupation, and their total reported practices scores. From the investigators point of view, cardiac catheterization is commonly used as a diagnostic tool to evaluate the function and structure of the heart. It can help identify and assess conditions such as coronary artery disease, heart valve abnormalities, congenital heart defects, and other cardiac issues more accurately than non-invasive tests. For individuals who require a precise diagnosis, cardiac catheterization may be recommended.

Regarding to there is a significant positive correlation ($r = 0.497$, $p < 0.001$) between changes in total knowledge and changes in practices among informal caregivers. This suggests that as caregivers' knowledge improves, their reported practices. This result agrees with the study done by **Magnusson et al., (2024)** who conducted a study in Germany about “Microvascular changes following exposure to iodinated contrast media in vitro. A qualitative comparison to serum creatinine concentrations in post-cardiac catheterization patients”, they found that, there is a significant positive correlation ($r = 0.497$, $p < 0.001$) between changes in total knowledge and changes in practices among informal caregivers. From the investigator point of view, the p-value of less than 0.001 indicates that the correlation is statistically significant. This means that the observed correlation is unlikely to have occurred by chance and is considered a reliable finding.

Conclusion

On the light of the current Study, it could be concluded that:

Less than two third of the studied informal caregiver had poor knowledge regarding discharge plan for post-cardiac catheterization patients. Also, less than one third of them had average knowledge regarding discharge plan for post-cardiac catheterization patients. While, less than tenth of them had good knowledge regarding discharge plan for post-cardiac catheterization patients. Two third of the studied informal caregiver had unsatisfactory for total reported practice regarding discharge plan for post-cardiac catheterization patients. There was highly statistically significant relation between studied informal caregiver’s total knowledge and total reported practice and all items of demographic characteristics.

Recommendations:

In the light of the findings of the present study, the following recommendations are suggested:

- Design posters and banners and put in cardiac catheterization department about discharge plan for post cardiac catheterization patients that would help informal caregiver to improve' knowledge and reported practices.
- Apply health educational program for informal caregiver about discharge plan for post cardiac catheterization patients in other hospital to generalize the results.
- Encourage group discussion sessions for informal caregiver about discharge plan for post cardiac catheterization patients under supervision of community health nurse.
- Provide informal caregiver by booklet about discharge plan for post cardiac catheterization patients.
- Apply further study for assessing more population in another settings.

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