A Resilience Bundle: An Interventional Study on Improving Self-Care Practice for Patients with Cardiac Surgery

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Abstract

Background: It is common for patients with cardiac surgery to experience physical and mental troubles after discharge from hospital and these complaints may substantially reduce self-care practice. Nowadays, there is an increasing interest in manipulating psychological factors as a means of enhancing surgical outcomes. The **Aim:** of this study is to evaluate the effect of resilience bundle on improving self-care practice for patients with cardiac surgery.

Research design: A Quasi-Experimental research design was used.

Subjects and Methods: A purposive sample of forty patients with cardiac surgery selected from cardiac outpatient clinic at Zagazig university hospitals. Two tools were used; "an interview questionnaire for the studied patients" and "Self-Administered Self-Care Practice Questionnaire".

Results: revealed that 85.0% of the studied patients were males, more than 40 years, married, educated, and living with their families. In the post- and follow-up phases of the intervention, most (92.5% & 90.0% respectively) of the studied subjects had satisfactory total knowledge level regarding cardiac surgery. Findings of the current study indicated statistically significant improvement among patients with cardiac surgery in self-care practice regarding nutrition, physical activity, managing psychological stress, pain medication control, self-relaxation state, and sleep quality after implementation of resilience bundle as there were high differences in the mean scores of items throughout the study phases ($p< 0.001$).

Conclusion: Studied patients showed significant improvement in self-care practice after practicing resilience bundle.

Recommendations: Similar study can be repeated by increasing sample size and possibly a trans-national study in order to further examine dependability of these results and generalizability.

Keywords

Resilience Bundle, Interventional Study, Self-Care Practice, and Cardiac Surgery.

Introduction

Cardiovascular diseases (CVDs) are recognized as the core cause of death all over the world. According to World Heart Report 2023, CVDs causing death of around 20.5 million individual every year, with more than 30 % of all deaths globally **(Laranjo et al., 2024).** Cardiac surgery is a common treatment approach and a universally approved intervention for cardiovascular diseases (CVDs) with nearly 1.5 million surgeries performed every year around the world **(Tai et al., 2021).** However, in Egypt, CVDs account for 40% of total

deaths **(Abdelhamid, 2020).** Cardiac surgery is a common treatment approach and a universally approved intervention for cardiovascular diseases (CVDs) with nearly 1.5 million surgeries performed every year around the world **(Tai et al., 2021).** There is a diversity of cardiac surgeries such as revascularization surgeries (coronary artery bypass grafting (CABG) surgery and coronary artery interventions (PCIs)), valvular (repair or replacement) surgeries, surgeries on the thoracic aorta, and surgeries for congenital heart diseases **(Bano, 2022).** However, there is a scarcity of information in Egypt regarding the pattern of risk variables for patients having CABG surgery **(Reda et al., 2019).**Although cardiac surgery has positive therapeutic outcomes on patients, helps them live better and getting back to their regular routines, patients may experience physical, mental, and social problems for several months following the procedure **(Ozcan et al., 2018).** Moreover, cardiac surgery has high perioperative risk and has a lot of characteristic physiological multiple organ dysfunction (**Senst et al., 2022).** Therefore, the patients with cardiac surgery require to be enrolled to cardiac rehabilitation interventions in order to enhance and effectively improve their recovery after surgery **(Shahmoradi et al., 2022).** In this regard, self-care training of patients with cardiac surgery has been shown to possess positive effects on their happiness and psychological status which necessitate paying attention to principled and planned educational interventions **(Molazem et al., 2022).**According to WHO, self-care encompasses personal and general hygiene, nutrition, lifestyle factors (such as physical exercise and leisure activities), socioeconomic factors (such as cultural beliefs and income level), self-medication, getting enough sleep, fostering and maintaining healthy relationships, seeking professional help when necessary, and adhering to treatment plans for current illnesses **(Battoro, 2022).**

Significance of the study

Cardiac surgeries help people live better lives and get back to their regular routines. Even though cardiac surgery has positive therapeutic outcomes, patients may experience physical, mental, and social problems for several months following the procedure **(Ozcan et al., 2018).** Determined by the clinical picture of the disease whether acute or chronic, treatment modalities of cardiovascular diseases may involve: risk factor handling, lifestyle modifications (such as having a balanced healthy diet, practicing physical exercises, and not smoking), pharmacological management using drugs, and percutaneous or surgical invasive procedures **(de Oliveira et al., 2023).** This study explores the existing research on the implementation and impact of resilience bundles in the context of cardiac surgery. In this era of increased emphasis on "improved recovery after cardiac surgery" programs, this study might provide an approach for enhancing patient recovery after cardiac surgery, maybe by including some optional physical and psychological interventions after surgery utilizing and facilitating some of patients' coping mechanisms (e.g., *education about condition, physical exercises, meditation, mindfulness, progressive muscle relaxation exercise, and deep breathing exercise).* According to the previous literature, it has been shown that higher psychological resilience is linked to better mental and physical health, including fewer depressive symptoms, less chronic pain, and decreased blood pressure resulted in better health outcomes for patients with cardiac surgery.

Aim of the study

The aim of this study was to evaluate the effect of resilience bundle in improving self-care practice for patients with cardiac surgery.

The aim was accomplished through the following specific objectives:

1. Assess knowledge for patients with cardiac surgery.
2. Assess self-care practice for patients with cardiac surgery.
3. Develop, implement, and evaluate the resilience bundle for patients with cardiac surgery.

Research hypothesis:

The following research hypotheses have been formulated to achieve the aim of the study:

H1: The mean knowledge scores will be higher after implementing resilience bundle for patients with cardiac surgery.

H2: Self-care practice will be improved after implementing resilience bundle for patients with cardiac surgery.

Operational definitions

Cardiac surgery is the surgical intervention that involves a variety of cardiac and revascularization surgeries including coronary artery bypass graft (CABG) surgery, coronary artery interventions (PCIs), and valve surgery.

Self-care practice is described as a term includes hygiene, nutrition, lifestyle factors (e.g., physical exercise level and leisure activities), socioeconomic factors such as cultural beliefs and person's income level, self-medication administration, getting good-quality sleeping, seeking professional help when needed, and

following treatment plan. It incorporates assessment of patient's knowledge about dietary management, physical activity, pain management, safe use of medications, self-relaxation, sleep quality, and managing psychological stress.

Resilience Bundle is a variety of acquired skills, attitudes, and interventions incorporates a case-related patient's education, dietary intervention, physical activity, deep breathing exercises, progressive muscle relaxation technique, meditation, and mindfulness.

Subjects and methods:

Research design:

Quasi-experimental one-group pretest/ posttest research design was utilized to achieve the aim of present study. Quasi-experiment is used to set up a cause-and-effect relationship between an independent and dependent variable, similar to the true experiment. However, quasi-experiment is different from true experiment in that it does not rely on random assignment of subjects to groups. Actually, quasi-experimental studies are frequently used in clinical specialties as nursing because they are more suitable for the real-world natural setting than true experimental research designs **(Thomas, 2022).**

Setting of the study: The present study was conducted in outpatient clinics building affiliated to Zagazig university hospitals. Cardiology clinics located in first floor and comprised of ECG clinic, stress ECG clinic, cardiothoracic surgery clinic, cardiac disorders clinic, heart rhythm disorders clinic, a hypertension clinic, in addition to a waiting area and two classrooms.

Subjects of the study:

- **Subjects:**

A purposive sample of 40 patients with cardiac surgery of both genders were recruited for this study.

- **Inclusion criteria:**

Patients who completed six months or more post cardiac surgery; ages of 18 to 60-year-old, stable general health status, and able to communicate.

- **Exclusion criteria:**

Patients who have complications that interfere with their self-care practice (as cerebral stroke, paralysis, or handicap), patients with cognitive or mental illnesses, and end-stage chronic diseases were excluded from the study.

- **Sample size:**

Sample size calculation based on year 2022 records of patients' admission to the cardio-thoracic surgery department, the total number of subjects assigned to perform cardiac surgeries was 400. Steve Thompson equation was used to calculate the sample size, at 5% ∞ error (95.0% significance), 20.0 β error, with 80.0%. power of the test.

$$n = \frac{N\,p(1-p)}{[\left[N-1\left(d^2 z^2\right)\right]+p(1-p)]}$$

Where: N= Population size (400), Z= degree of standardization for 95.0% significance, it is equal to 1.96, d= Error percentage (0.05), P= Percentage of occurrence of event or not, it is 0.5. Accordingly, the sample size was determined to be 39.99. Therefore, 40 patients were enrolled and assigned to receive resilience bundle.

- Sampling technique:

A purposive sample of 40 cases of patients with cardiac surgery of both genders who follow up in cardiology clinic at Zagazig university hospitals were recruited for this study fulfilling the inclusion criteria.

Tools of data collection:

Two tools were used to collect the necessary data in this study. These tools involved:

Tool I: Patient's Interview Questionnaire: It was developed by the researcher after reviewing related literature in a simple Arabic language to avoid misunderstanding. It was composed of three parts:

Part I: Demographic data of the study participants were consisted of eight closed-ended questions including "patient's age, gender, marital status, educational level, occupation, residence, income, and living status.

Part II: Health history and cardiovascular health assessment of study participants were composed of nine questions about medical diagnosis, previous cardiac surgeries, type of surgery, comorbidities, associated manifestations, family history, smoking, drug allergies, and Patient cardiovascular health assessment questionnaire". It was scored using frequency and percentage distribution of the studied patients according to health history.

Part III: Patient's knowledge regarding health condition, line of treatment, complications, medications, nutritional status, physical activity, pain management, and sleep quality. It was adapted from **(Farzam & Jan, 2024), (Kabir et al., 2024), (Li et al., 2024), (Whitlock, 2024), (Alpert, 2023),** (**Arif & Aggarwal, 2023), (de Oliveira et al., 2023), (Diab et al., 2023), (Grant et al., 2023), (Moneruzzaman et al., 2023), (Reinhart, 2023), and (Reintjes, 2023).**

Part III included 40 questions divided into six sections.

Section A: Patient's knowledge regarding health condition, line of treatment, and complications. It included six multiple-choice questions.

Section B: Patient's knowledge regarding medications. It included six single-and eight multiple-choice (total of fourteen) questions.

Section C: Patient's knowledge regarding nutrition. It included one single- and five multiple-choices (total of six) questions.

Section D: Patient's knowledge regarding physical activity. It included six multiple-choice questions.

Section E: Patient's knowledge regarding pain management. It included four multiple-choice questions.

Section F: Patient's knowledge regarding sleep quality. It included one single- and three multiple-choice (total of four) questions.

Total scoring of knowledge questions:

The total number of questions regarding knowledge was 40 questions with a total score of 156 grades (100%). In questions (8, 9, 12, 16, 19, 20, 24, and 39), each question had one correct answer, if the patient's answer was correct, patient would score one grade. On the other hand, the remaining questions had more than correct answer and scored 1 for each correct choice out of total question score and then all selected options were collected, and score given. However, in question (3), options a and b were correct; so that each option scored one grade and then selected options collected and score given. If the patient selects "both a and b", patient would score the total marks of the question. The option of "I don't know" had a score of zero grade. Based on statistical analysis, knowledge level was considered satisfactory at cut-off point ≥ 70% and it was considered unsatisfactory at cut-off point < 70%.

Tool II: Self-Administered Self-Care Practice Questionnaire:

It was designed to assess patients' self-care practice and consisted of six parts: nutrition, physical activity, pain medication control, self-relaxation state, sleep quality, and managing psychological stress.

Part I: Self-reported dietary questionnaire (Pre/Posttest).It was adapted from **Bishop et al. (2019)** and composed of three sections. Section one that included five questions about the average intake of food groups and beverages on daily basis. Section two included three questions about the current food habits. Section three that included five questions about average intake of food groups on weekly basis. The total score of self-reported dietary questionnaire was 23 grades (100%): (10 for section one, three for section two (Yes=1, No=0) and 10 for section 3). In this questionnaire total scores of 0–7 out of 23 represented a low dietary adherence, total scores of 8-15 out of 23 denoted an intermediate adherence, whereas total scores of 16-23 out of 23 revealed a high level of dietary adherence.

Part II: Physical activity assessment questionnaire (pre/posttest).It was adapted from **IPAQ (1998)** and developed by the researcher based on the IPAQ-short form designed by **Craig et al. (2017)**. It was used to assess patient's practice of physical activity. It included eight questions about patient's practice of high intensity physical activity" and "the time had been spent each day", "patient's weekly practice of moderate intensity physical activity" and "the time had been spent each day", "patient's weekly practice of low intensity physical activity" and "the time had been spent each day", "the times spent in walking for at least 10 minutes", and "the time had been spent every day in walking". The total score of physical activity assessment questionnaire was 16 grades (100%). Each question had three answers; "never, once, twice", or " never, 30 min, 30-60 min" scored on Likert scale (0, 1, 2) consecutively. The patient was considered at low risk if the score was 0 – 20 grades; and considered at moderate risk if the score was 21 – 30 grades. However, the patient was considered at high risk if the score was 31- 60 grades. Based on statistical analysis, physical activity level was considered satisfactory at a cut-off point ≥ 70% and it was considered unsatisfactory at cut-off point < 70%.

Part III: Pain Medication Questionnaire.This tool was adapted from **Boulder Pain Institute's Pain Medication Questionnaire (2015).** It was used to assess patient's use of pain medications and their risks. It was developed by the researcher and composed of fifteen questions.The total score of Pain Medication Questionnaire was 60 (100%).

All items scored on a five-point Likert scale which varied from never to very often and scored 0 to 4 respectively. Based on statistical analysis of this questionnaire: low risk was scored 0 to 20 out of 60, moderate risk was scored 21–30 out of 60, while high risk was scored more than 30 and up to 60 out 60.

Part IV: Self-Relaxation State Scale (behavioral relaxation self-rating scale):This tool was adapted from **Poppen. (1988).** It's is a self-report instrument used immediately before and after demonstrating relaxation session. Seven statements were involved in this tool describing various degrees of relaxation and tension state.

Scoring system of behavioral relaxation self-rating scale: The patient was required to select the phrase that best described the state of relaxation/tension felt (before vs. after relaxation session). The state of relaxation was measured on a 7-point Likert scale varied from "feeling very tense in all over the body" to "feeling complete and deep relaxation in whole body never felt before" scored from 1 to 7, consecutively. Pre - post differences in the scores of each session were added and expressed as Mean and Standard Deviation.

Part V: Sleep Quality Questionnaire.Sleep Quality Questionnaire (self-rated questionnaire) was adapted from the Pittsburgh Sleep Quality Index (PSQI) which was designed by **Buysse et al. (1989)** with a sensitivity of 89.6% and a specificity of 86.5% to measure sleep quality and disturbance over the past month in clinical populations. It was composed of 19 items grouped into seven subscales assessing in a subjective way sleep duration, sleep disturbance, sleep latency, daytime dysfunction due to sleepiness, sleep efficiency, overall sleep quality, and sleep medication use. The sleep components were scored on a four-point Likert scale (0 - 3) which varied from the least to the greatest dysfunction, consecutively. However, questions (5, 6, 7, and 8) scored on four-point Likert scale (0 - 3) that varied from ("Not", "Less than once per week", "Once or twice per week", and "Three or more times per week", consecutively. But, question (9) was about the patient's overall quality of sleep and scored on four-point Likert scale (0 - 3) as "very good", "fairly good", "fairly bad", and "very bad", consecutively. Scores of the sleep components were summed to get a total score ranging from 0 to 21 with the higher total score indicated worse sleep quality. The overall score was 21(100%). A total score of ≥ 5 indicated poor sleep quality, while a total score of < 5 indicated good sleep quality based on **Buysse et al. (1989).**

Part VI: Managing psychological stress sheet: It was adapted from **Patterson & McCubbin (1987)** and it was composed of 11 coping strategies used to manage psychological stress. In this part, the patient was required to select the coping strategies that could be used to manage psychological stress by choosing "Yes" or "No" options. Managing psychological stress was scored as satisfactory / unsatisfactory where total score of ≥ 70 % was considered as satisfactory and total score of < 70 % was considered as unsatisfactory (based on statistical analysis).

Face and content validity: The tools were revised by a panel of five expertise professors from different specialties including medical and nursing faculty staff included three professors of medical surgical nursing and two professors of cardiology reviewed the tools' content for clarity, relevance, comprehensiveness, applicability, understandability, and easiness for implementation. All recommended modifications were done.

Internal consistency (reliability) of the tool: Cronbach's alpha test was used to measure the internal consistency (reliability of used tools). It was (0.804) for self-reported dietary questionnaire; it was (0.835) for physical activity assessment questionnaire; it was (0.856) for pain medication questionnaire; it was (0.722) for self-relaxation state scale; it was (0.747) for sleep quality questionnaire; and it was (0.782) for managing psychological stress.

Administrative and Ethical Considerations:

An official permission for conducting the study in Zagazig University Hospitals was obtained from the hospital administrative personnel and the directors of the outpatient clinics by the submission of formal letter from the dean of the faculty of nursing to conduct this study. At the interview, an informed consent for participation was taken both verbally and in written form each patient after full explanation of the aim of the study. They were informed that their participation in this study is voluntary. The patients were given the opportunity to refuse participation and notified that they could withdraw at any phase of the data collection without given reason. Moreover, the patients were assured that any information taken from them would be confidential and used only for research purposes.

A Pilot study: It was conducted on 10% of total sample to judge the feasibility of conducting the study, its objectivity, and ability to elicit the desired information, and to estimate time needed for data collection as well as to identify any possible obstacles that may hinder the data collection.

Moreover, the pilot study helped in estimation of time required to fill in the sheets. Then, the tools were modified according to the results of pilot study.

Field work:

Preparatory (Assessment) phase: This phase was concerning to construction of the study tools and production of resilience bundle by the researcher based on extensive review of current, related literature; it was written by simple Arabic language and included colored pictures with simplified illustrations to facilitate patients' understanding. Once all necessary permissions were granted officially to proceed with the study, the field work was started in January and lasted to September 2024. The researcher visited the study setting, met with the director and head nurses to explain the aim of the study and the needed procedures, and to get their approval and cooperation. Then the researcher met patients with cardiac surgery who were eligible for the study, introduced himself, and the study purpose was explained. The patient who gave verbal and written consent to participate was interviewed individually, handed the self-administered questionnaires, and received relevant instructions regarding filling process. The study was conducted through four phases: preparatory, planning, implementation, and evaluation.

Planning phase:

During this phase, the researcher designed the resilience bundle based on review of the most recent, relevant, and appropriate literature, and under the guidance of the supervisors. The main goal was to evaluate the effect of resilience bundle in improving self-care practice for patients with cardiac surgery. It involved three parts; knowledge part, self-care practice part, and resilience bundle application part.

Implementation phase:

The study was implemented in the form of sessions carried out in the study settings for the study participants over four days on weekly basis (Sunday, Monday, Wednesday, and Thursday) from 9:00 am to 1:00 pm.The researcher interviewed the study participants to implement resilience bundle on individual basis and in small groups (2-3 participants) meetings. The content of the resilience bundle intervention was distributed over 8 consecutive sessions (each session was covered over 50–60 minutes). The first session was dedicated for orientation to clarify aim and contents of the resilience bundle intervention, its general objectives, the teaching methods, learner's activities, and evaluation methods. Three sessions covered the theoretical part of the intervention, whereas the remaining four sessions were for the practical part. These included one session for demonstration and re-demonstration of the pre-determined physical exercises, one session for demonstration and re-demonstration of steps of breathing exercises, one session for demonstration and re-demonstration of steps of progressive muscle relaxation exercise, and the last session for demonstration and re-demonstration of steps of meditation and mindfulness exercises. Theoretical part covered in the first chapter of the booklet, and the practical part covered over the second and third chapters for the purpose of guiding the patients. The researcher handed the booklet of the resilience bundle intervention to each patient participated in the study.

Evaluation phase:

The researcher evaluated the study sample over three phases (pre-, post, and follow-up) to get the results representing the effect of resilience bundle in improving self-care practice for patients with cardiac surgery.

Intervention sessions and guide:

In addition, a booklet in Arabic language was designed and developed by the researcher according to the needs of patients, relevant scientific references, and the opinions of specialists in the field. It includes a theoretical part and two parts for the practical aspect.

Statistical Analysis:

The collected data were revised, coded, organized, tabulated, and statistically analyzed using SPSS 25.0 for windows. Quantitative data were expressed as the mean ± SD & (range), and qualitative data were expressed as absolute frequencies (number) & relative frequencies (percentage). Percentages of categorical variables were compared using Chi-squared test ($\chi 2$) or Fisher's exact test when appropriate. Quantitative continuous data were compared using one-way ANOVA or Kruskal-Wallis tests. Spearman rank correlation coefficient was calculated to assess relationship between various study variables, (+) sign indicated direct and positive correlation & (-) sign indicated an inverse correlation, also values near to 1 indicated strong correlation & values near to 0 indicated a weak correlation. Specifically, r = 0.1 - 0.24 indicated a weak correlation; r = 0.25 - 0.74 indicated an intermediate correlation; and r = 0.75 - 0.99 indicated a strong correlation. Also, multiple linear regression analysis was used to compare the two classes. All tests were two-sided. P-value ≤ 0.05 was considered statistically significant (S), and p-value > 0.05 was considered statistically insignificant (NS).

Results

The results of the study were tabulated as follows:

Table 1: Frequency and Percentage Distribution of Demographic Characteristics of Study Subjects (N=40).

Demographic characteristics	Studied patients	
	Frequency (No.)	Percent. (%)
Age (year)		
< 40	2	5.0
≥ 40	38	95.0
Mean± SD	54.52±0.92	
Range	38-60	
Gender		
Male	34	85.0
Female	6	15.0
Marital status		
Married	38	95.0
Not married	2	5.0
Educational Level		
Educated	38	95.0
Not Educated	2	5.0
Occupation		
Working	19	47.5
Not working	21	52.5
Place of residence		
Rural	10	25.0
Urban	30	75.0
Income		
Sufficient	21	52.5
Insufficient	19	47.5
Living status		
With family	38	95.0
Without family	2	5.0

Table 1: Reveals that the most studied patients' ages were more than 40 years with the mean age (54.52±0.92) and majority (85%) of the studied patients were males. Also, the most of the studied patients (95%) were married, educated, and living with their families. Moreover, more than half of patients not working and had a sufficient income (52.5%). Finally, only one-quarter of the studied patients lived in rural areas.

Table 2: Frequency and Percentage Distribution of the Studied Patients According to Health History (N=40).

Health History	Frequency (No.)	Percent. (%)
Diagnosis		
Coronary artery bypass grafting (CABG)	17	42.5
Ischemic heart disease (IHD)	15	37.5
Valve replacement	6	15.0
Mitral valve stenosis	2	5.0
Comorbidity		
Hypertension (HTN)	13	32.5
Diabetes (DM)	11	27.5
Osteoarthritis	1	2.5
Bone Fracture	4	10.0
Respiratory diseases	2	5.0
Chronic Kidney Diseases	1	2.5
Liver Diseases	1	2.5
Ophthalmic problems	5	12.5
Manifestations		
Chest pain	26	65.0
Dyspnea	22	55.0
Palpitation	14	35.0
Headache	12	30.0
Sputum	20	50.0
Fatigue	30	75.0
Loss of appetite	7	17.5
Family history		
Yes	24	60.0
No	16	40.0
Smoking		
Current smoker	21	52.5
Previous smoker	11	27.5
Not smoker	8	20.0

Table 2: Shows that more than two-fifths (42.5%) of the studied patients had a diagnosis of CABG, most (97.5%) of the studied patients had previous surgeries, and three-quarters (75%) of the studied patients had percutaneous coronary intervention. Regarding comorbidity, (32.5% & 27.5% respectively) of the studied patients had hypertension and diabetes. Regarding patients' manifestations, nearly two-thirds (65%) of patients had chest pain, and three-quarters (75%) had fatigue. Also, three-fifths (60%) of the studied patients had a previous family history of cardiac surgeries, and more than half (52.5%) of the sample were current smokers.

Table 3: Frequency and Percentage Distribution of the Studied Patients According to Cardiovascular Health Assessment (Hemodynamic, Investigations and Related Data) throughout Study Phases (N=40)

Assessment Data	Pre		Post		Follow-Up		$\chi 2$ (P_1- value) Pre/post	$\chi 2$ (P_2- value) Pre/FU
	No.	%	No.	%	No.	%		
Systolic blood pressure Normal	29	72.5	36	90.0	38	95.0	4.021	7.440
Abnormal	11	27.5	4	10.0	2	5.0	0.083	0.013*
Diastolic blood pressure Normal	29	72.5	36	90.0	38	95.0	4.021	7.440
Abnormal	11	27.5	4	10.0	2	5.0	0.083	0.013*
Adventitious breath sounds	27	67.5	36	90.0	38	95.0	6.050	9.928
None	13	32.5	4	10.0	2	5.0	0.027*	0.003*
Crackles								
Cholesterol level								
Normal	25	62.5	37	92.5	37	92.5	10.323	10.323
Abnormal	15	37.5	3	7.5	3	7.5	(0.003*)	(0.003*)
Chest pain								
No	11	27.5	20	50.0	25	62.5	7.168	11.944
Only with effort	25	62.5	20	50.0	15	37.5	(0.019)	(0.002*)
Always	4	10.0	0	0.0	0	0.0		
Body Mass Index (BMI)	1	2.5	3	7.5	2	5.0	7.655	9.577
Underweight	10	25.0	19	47.5	22	55.0	(0.052)	(0.016*)
Normal	24	60.0	17	42.5	15	37.5		
Overweight	5	12.5	1	2.5	1	2.5		
Obese								
Blood glucose level								
Normal	25	62.5	32	80.0	34	85.0	2.990	5.230
Abnormal	15	37.5	8	20.0	6	15.0	(0.137)	(0.041*)

***: Statistically significant at $p \leq 0.05$; ($\chi 2$): chi-square test**
P_1: P-value for comparing between study group at pre- and post-intervention
P_2: P-value for comparing between study group at pre- and follow-up phase.

Table 3: Clarifies that there were statistically significant differences between systolic and diastolic blood pressure of the studied patients throughout the pre- and follow-up phases of the study with an exact p-value of 0.013. In addition, there were statistically significant relations between adventitious breath sounds (Crackles) of the studied patients in the Pre/Post and Pre/Follow-up intervention phases with p-values of 0.027 & 0.003 respectively.The same table indicates that there were high statistically significant relations between cholesterol levels of the studied patients in the Pre/Post and Pre/follow-up intervention phases with a p-value of 0.003. Moreover, there were statistically significant relations between chest pain and BMI of the studied patients in Pre/Post and Pre/Follow-up intervention phases with p-values (0.019 & 0.002) and (0.052 & 0.016) respectively. Also, there were statistically significant differences between blood glucose level of the studied patients in Pre/Follow-up intervention phases with exact p-value of (0.041).

Table 4: **Frequency Distribution of Total Level of Satisfactory Patients' Knowledge Regarding Cardiac Surgery throughout Study Phases (N=40)**

Patients' Knowledge Regarding Cardiac Surgery	Pre		Post		Follow-up		$\chi 2$ (P_1- value) Pre/post	$\chi 2$ (P_2- value) Pre/FU
	No.	%	No.	%	No.	%		
knowledge regarding health condition, line of treatment, and complications	19	47.5	40	100.0	39	97.5	28.475 (<0.001*)	25.078 (<0.001*)
Mean± SD	15.87±3.45		21.87±1.15		21.50±1.61		H=66.487	(<0.001*)
Patient's knowledge regarding medications	2	5.0	37	92.5	37	92.5	61.288 (<0.001*)	61.288 (<0.001*)
Mean± SD	12.80±5.28		30.65±3.20		29.37±3.78		H=79.512	(<0.001*)
Patient's knowledge regarding nutrition	19	47.5	40	100.0	39	97.5	28.475 (<0.001*)	25.078 (<0.001*)
Mean± SD	14.05±3.18		19.15±1.07		18.47±1.92		H=64.310	(<0.001*)
Patient's knowledge regarding physical activity	28	70.0	37	92.5	36	90.0	6.646 (0.020*)	5.0 (0.048*)
Mean± SD	21.50±2.56		25.12±4.12		23.57±4.73		H=35.925	(<0.001*)
Patient's knowledge regarding pain management	28	70.0	36	90.0	36	90.0	5.0 (0.048*)	5.0 (0.048*)
Mean± SD	22.57±1.79		26.50±4.10		24.65±4.78		H=50.744	(<0.001*)
Patient's knowledge regarding sleep quality	19	47.5	38	95.0	37	92.5	22.029 (<0.001*)	19.286 (<0.001*)
Mean± SD	9.80±1.50		13.12±1.95		12.27±1.90		H=51.035	(<0.001*)
Total Level of knowledge: ≥ 70 % Satisfactory	6	15.0	37	92.5	36	90.0	48.322 (<0.001*)	45.113 (<0.001*)
< 70 % Unsatisfactory	34	85.0	3	7.5	4	10.0		
Mean± SD	96.60± 10.42		136.42± 12.79		129.85± 15.68		H=50.690	(<0.001*)

*:

Statistically significant at p ≤ 0.05; (H): Kruskal Wallis test; ($\chi 2$): chi-squared test
P_1: P-value for comparing between study group at pre- and post-intervention
P_2: P-value for comparing between study group at pre- and follow-up phase.

Table 4: Clarifies that in the pre-intervention phase, the majority (85.0%) of the studied subjects had unsatisfactory knowledge regarding cardiac surgery with Mean± SD = 96.60±10.42, while in the post- and follow-up phases of the intervention, most (92.5% & 90.0% respectively) of the studied subjects had satisfactory knowledge regarding cardiac surgery with Mean± SD=136.42±12.79 & 129.85±15.68 respectively.

Table 5: **Patients' Self-Care Practice Regarding Nutritional Level of Adherence, Total Physical Activity, and Pain Medication Control Risk throughout the Study Phases (N=40).**

Item	Pre		Post		Follow-up		$\chi 2$ (P_1- value) Pre/post	$\chi 2$ (P_2- value) Pre/FU
	N	%	N	%	N	%		
Self-Care Practice Regarding Nutritional Level of Adherence								
Low adherence (0 – 7)	5	12.5	0	0.0	0	0.0		
Intermediate adherence (8 -15)	35	87.5	23	57.5	15	37.5	24.483 (<0.001*)	38.000 (<0.001*)
High adherence (16-23)	0	0.0	17	42.5	25	62.5		
Mean± SD	10.55±2.83		15.10±1.95		15.47±2.08		H=38.773	(<0.001*)
Total Physical Activity:								
≥ 70 % is Satisfactory	1	2.5	30	75.0	28	70.0	44.292 (<0.001*)	39.432 (<0.001*)
< 70 % is Unsatisfactory	39	97.5	10	25.0	12	30.0		
Mean± SD	5.70±2.18		11.20±2.17		10.97±1.96		H=71.730	(<0.001*)
Pain Medication Control Risk								
Low Risk: 0 – 20	27	67.5	37	92.5	36	90.0		
Moderate Risk: 21 – 30	10	25.0	3	7.5	4	10.0	8.332 (0.009*)	6.875 (0.023*)
High Risk: > 30 up to 60	3	7.5	0	0.0	0	0.0		
Mean± SD	14.40±6.40		9.40±2.30		9.87±3.13		H=32.429	(<0.001*)

***: Statistically significant at p ≤ 0.05; (H): Kruskal Wallis test; ($\chi 2$): chi-squared test**
P_1: P-value for comparing between study group at pre- and post-intervention
P_2: P-value for comparing between study group at pre- and follow-up phase.

Table 5: Shows that in pre-intervention phase, the majority (87.5%) of the studied subjects had intermediate level of adherence in self-care practice regarding nutrition with Mean± SD =10.55±2.83, while in post- and follow-up phases of the intervention (42.5% & 62.5% respectively) had high level of adherence in self-care practice regarding nutrition with Mean± SD =15.10±1.95 &15.47±2.08 respectively with highly statistically significant differences (p< 0.001). Also, this table indicates that, in pre-intervention phase, most (97.5%) of the studied subjects had unsatisfactory self-care practice regarding physical activity with Mean± SD =5.70±2.18 while only one-quarter (25.0%) in post-intervention phase and nearly one-third (30.0%) in follow-up phase of studied patient had unsatisfactory self-care practice regarding physical activity with Mean± SD =11.20±2.17 &10.97±1.96 respectively with highly statistically significant differences (p< 0.001). Furthermore, this table shows that in pre-intervention phase, about two-thirds of the studied subjects (67.5.0%) had low risk of self-care practice regarding pain medication control with Mean± SD =14.40±6.40 while most (92.5% & 90.0% respectively) of the studied patients in post-intervention and follow-up phases had low risk of self-care practice regarding pain medication control with Mean± SD = 9.40±2.30 and 9.87±3.13 respectively. However, in follow-up phase, no one (0.0%) of the studied patients had high risk in self-care practice regarding pain medication control with Mean± SD = 9.87±3.13 with highly statistically significant differences (p< 0.001).

Table 6: **Patients' Self-Care Practice Regarding Total Scoring of: Self-Relaxation State, Sleep Quality, and Managing Psychological Stress throughout the Study Phases (N=40).**

Item	Pre		Post		Follow-up		$\chi 2$ (P_1- value) Pre/post	$\chi 2$ (P_2- value) Pre/FU
	N	%	N	%	N	%		
Self-relaxation Total Scoring:								
≥ 60 %: Good Relaxation	0	0.0	33	82.5	33	82.5	56.170 (<0.001*) H=22.432	56.170 (<0.001*) (<0.001*)
< 60 %: Poor Relaxation	40	100.0	7	17.5	7	17.5		
Mean± SD	3.5±2.20		5.5±1.72		5.5±1.72			
Sleep Quality Total Scoring								
Poor sleep quality ≥ 5	32	80.0	9	22.5	7	17.5	26.467 (<0.001*)	31.270 (<0.001*)
Good sleep quality < 5	8	20.0	31	77.5	33	82.5		
Managing Psychological Stress Total Scoring								
≥ 70 % Satisfactory	7	17.5	34	85.0	35	87.5	36.473 (<0.001*)	47.881 (<0.001*)
< 70 % Unsatisfactory	33	82.5	6	15.0	5	12.5		
Mean± SD	6.20±1.63		8.87±1.69		9.00±1.76		H=35.771	(<0.001*)

***: Statistically significant at p ≤ 0.05; (H): Kruskal Wallis test; ($\chi 2$): chi-squared test**
P_1: P-value for comparing between study group at pre- and post-intervention
P_2: P-value for comparing between study group at pre- and follow-up phase.

Table 6: Shows that in the pre-intervention phase, all (100.0%) of the studied subjects felt general tension all over the body and felt some tension in some parts of the body regarding self-relaxation state with Mean± SD =3.5±2.20, while the majority (87.5%) of the studied patients in post and follow-up phases felt a complete and deep relaxation in the whole body that never felt before related to self-care practice regarding self-relaxation state with Mean± SD =5.5±1.72 & 5.5±1.72 respectively with highly statistically significant differences (p< 0.001). Moreover, in the pre-intervention phase, all (100.0%) of the studied subjects had poor relaxation state according to the total score with Mean± SD =3.5±2.20, while the majority (82.5% & 82.5% respectively) of the studied patients in post- and follow-up phases had good relaxation state according to the total score with Mean± SD =5.5±1.72 & 5.5±1.72 respectively. Additionally, this table shows that in the pre-intervention phase, four-fifths of the studied subjects (80.0%) had poor sleep quality, while over three-quarters (77.5%) of the studied patients in the post-intervention phase and (82.5%) in the follow-up phase had good sleep quality with high statistically significant differences (p< 0.001). Similarly, this table illustrates that the majority (82.5%) of the studied patients had unsatisfactory self-care practice based on score of managing psychological stress in the pre-intervention phase with Mean± SD =6.20±1.63 and (85.0%) of the studied patients in the post-intervention phase had a satisfactory self-care practice according to score of managing psychological stress with Mean± SD =8.87±1.69. The majority (87.5%) of the studied patients had satisfactory self-care practice based on score of managing psychological stress in the follow-up phase with Mean± SD =9.00±1.76 with high statistically significant differences (p< 0.001).

Table 7: Correlation coefficient between patients' knowledge and self-care practice in the Post-Intervention Study Phase (N=40)

Items		Knowledge		Nutrition		Physical activity		Pain medication		Sleep quality		Coping strategy	
		r	p	r	p	R	p	r	p	r	p	r	p
Post	Knowledge	-	-	.357*	.024	.414**	.008	-.335*	.034	-.552**	<0.001	.396*	.011
	Nutrition	.357*	.024	-	-	.196	.225	-.197	.222	-.013	.939	.327*	.040
	Physical activity	.414**	.008	.196	.225	-	-	-.139	.392	-.106	.515	.105	.520
	Pain medication	-.335*	.034	-.197	.222	-.139	.392	-	-	.347*	.028	.084	.608
	Sleep quality	-.552**	<0.001	-.013	.939	-.106	.515	.347*	.028	-	-	-.173	.285
	Coping strategy	.396*	.011	.327*	.040	.105	.520	.084	.608	-.173	.285	-	-

(*) Statistically significant at p<.05; (**) statistically significant at p<.01; (r) Spearman rank correlation

Table 7: Shows that in the post-intervention phase, there were high statistically significant positive correlations between patients' knowledge and physical activities (r =0.414 at P< 0.01). There was a high statistically significant negative correlation between patients' knowledge and sleep quality (r = -.552 at P< 0.01). Also, there was a statistically significant negative correlation between patients' knowledge and pain medication risk r = -.335 at P< 0.05.

Discussion:

Discussion of the current study findings with other relevant research findings investigating the related areas of the study will be presented in parts including; demographic characteristics, health history, and cardiovascular health assessment of study participants; frequency distribution of patient's total level of satisfactory knowledge regarding cardiac surgery and relevant items; patients' self-care practice regarding cardiac surgery (nutritional level of adherence, total physical activity, pain medication control risk, self-relaxation state, sleep quality, and managing psychological stress throughout the study phases; relations between different variables and demographic characteristics of study subjects; in addition to correlation coefficient between patients' knowledge and self-care practice.

Regarding socio-demographic characteristics, results of the present study revealed that the majority of the studied patients were more than 40 years old. These findings were supported by **El-ghiety et al. (2019)** study indicated that around two-thirds of the studied adult patients were between 40 and 60 years and male patients accounted almost two-thirds of the total (60 participants) sample.Also, results of the present study indicated that the majority of the studied patients were males which were in line with **Chaganty et al. (2023)** aimed at studying the temporal evolution in cardiovascular disease-related mortality that revealed a higher prevalence of cardiovascular diseases in males than females throughout the study period which might support our findings. In researcher's point of view, these findings could be rationalized as mentioned in **Alpert (2023)** study conducted in United States about "new coronary heart disease risk factors" that older ages and male gender were considered as risk factors increasing continuously the prevalence of cardiovascular diseases.

Regarding patients' level of education, in the present study, the majority of studied patients were educated. These findings were supported by **Mousa Elsaed et al. (2020)** study which revealed that more than two-thirds of the studied patients were educated and more than half of total number of studied patients had university education. On the other hand, **Ceylan et al. (2024)** findings of the study were opposite to our study findings in that more than a half of the studied participants had low level of education.

Regarding health history, results of the present study showed that more than two-fifths of the studied patients had CABG surgery. These findings were congruent to some degree with **Vervoort et al. (2024)** study reported that globally, approximately one-quarter of patients with cardiac surgeries had CABG between 2010 and 2021.

Regarding comorbidity, around one-third of studied patients had diabetes and hypertension. These findings were in line with **Bianco et al (2020)** in cohort study which indicated that more than one-third of studied patients were had diabetes. Also, **Sallam et al. (2022)** study indicated that nearly one-third of the studied

patients had hypertension. Around one-third of studied patients had diabetes and hypertension, and three-fourths of them had previous family history to CVD. The discussed findings regarding patient's health history were supported by **Alpert (2023)** study conducted in United States about "New coronary heart disease risk factors" that showed diabetes mellitus, hypertension, positive family history for early manifestations of coronary artery disease, smoking, and sedentary lifestyle as risk factors increasing continuously the prevalence of cardiovascular diseases.

Regarding clinical manifestations, the findings of the present study showed that two-thirds of the studied patients had chest pain. These results could be related to many reasons such as surgical incisions, rib retraction, sternal fracture, prolonged immobility, intercostal nerve stimulation and pleural irritation from chest tubes. The findings of the present study were similar to **Öğüt & Dağ (2019)** study which revealed that a half to three-quarters of patients report post cardiac surgery pain.Similarly, these findings were in line with **El-gafour et al. (2021)** study which revealed that around three-quarters of patients reported moderate to severe post cardiac surgery pain. Also, the findings of the present study showed that three-quarters had fatigue, and these findings were supported by **Yaman Aktas et al. (2021)** indicated that about half of patients in discharge training group had fatigue. Moreover, the findings of the present study showed that more than a half of the studied patients had exertional dyspnea. These problems were caused by the fact that post cardiac surgery pain hinders deep breathing, coughing, and ventilation thereby impedes getting rid of respiratory tract secretions, reducing vital lung and functional residual capacity, and consequently increases shortness of breath. According to **Srimookda et al., (2021),** it is common that patients complain of dyspnea symptom following surgery.The findings of the present study were harmony with **Ali Ahmed et al. (2024)** study entitled "Dyspnea, fatigue and sleep quality post cardiac surgeries: effect of selected relaxation techniques" conducted on 90 patients at Minia university's cardiothoracic hospital in Egypt. which showed that nearly three-quarters of the studied patients had mild to moderate exertional dyspnea after eight weeks of having cardiac surgery.

Regarding cardiovascular health assessment, the results of the current study clarify the relation between hemodynamic data of studied patients throughout the study phases. Regarding BP, there were statistically significant progressive improvement in both SBP and DBP of the studied patients throughout pre- and follow-up phases of the study. On pre-intervention phase, nearly three-quarters of patients had normal SBP and DBP. On the other hand, majority of patients in post-intervention and follow-up phases had normal systolic and diastolic BP.These findings were compared to and supported by **Senesael et al. (2023)** study that revealed decrease in blood pressure readings in more than two-fifths of the participants. Significant relation between improved exercise capacity and improved blood pressure was observed as the patients had higher systolic blood pressure at the commencement of the sessions; while the mean systolic blood pressure for all patients was within normal limits at the end of the cardiac rehabilitation program.In addition, there were statistically significant relations between adventitious breath sounds (crackles) of studied patients in Pre/Post and Pre/FU intervention phases; indicating an improvement in respiratory function due to breathing exercises. These findings were supported by **Oshvandi et al. (2020)** study showed that the group received breathing exercises had a significant improvement in pulmonary crackles on auscultation when compared to the control group.

Regarding laboratory and clinical investigations, the results of current study indicate that, there were high statistically significant relations between cholesterol levels of the studied patients in Pre/post and Pre/FU intervention phases. These results were congruent with **(Du et al., 2020)**.

The study found that at six months after intervention, total cholesterol levels in the study group were significantly lower than those in the control group (P<0.05). The findings of the present study could be supported by and rationalized according to **Reinhart (2023)** reported that patient's blood pressure, blood cholesterol levels, and abdominal fat can be influenced by heart-healthy diet and eating habits. Similarly, the findings of the present study illustrated that there was statistically significant improvement in chest pain of the studied patients in Pre/post and Pre/FU intervention phases. These findings were supported by **Viana, et al. (2023)** revealed a statistically significant reduction in pain intensity upon hospital discharge after suitable postoperative pain management compared to pain in ICU. Moreover, the findings of the present study illustrated that there were statistically significant changes in BMI and fasting blood glucose level of the studied patients in Pre/post and Pre/FU intervention phases. Our study findings were supported by **Aslan, et al., (2019)** study showed a statistically significant decline in BMI and fasting blood glucose (FBS) level in exercise and diet groups, which may reflect the importance of combining of diet and exercise programs seems to be more effective.

Regarding total knowledge level about cardiac surgery, the findings of the present study indicated that in the pre-intervention phase, the majority of the studied subjects had unsatisfactory total knowledge level; while in the post and follow-up phases of the intervention, most of the studied patients had satisfactory total knowledge level regarding health condition, line of treatment, and complications; medications; nutritional status; physical activity; pain management; and sleep quality with statistical significant difference of p<0.05 .From the researcher's point of view, these findings regarding knowledge reflects the positive impact of resilience bundle implementation, which met the needs of patients with cardiac surgery and offered them sufficient knowledge to maintain their health. The findings of the current study were in the same line with **Buket & Ebru, (2018)** revealed that knowledge levels of patients were improved well after receiving a structured planned patients' education about cardiac surgery.

Regarding dietary adherence, the present study revealed that that in pre-intervention phase, the majority of study subjects had intermediate self-care practice and no one had high self-care practice regarding nutritional adherence, while nearly a half of studies patients in post-intervention and about two-thirds of studied patients in the follow-up phase had high levels of self-care practice regarding nutritional adherence with statistically significant differences at P-value < 0.05. However, one item in the current study was about "weekly consumption of red meat" got opposite results to nutritional guide. This may be due to cultural factors in the country.

Researchers' comments: Based on previous studies, there are some limitations to adopting a heart-healthy diet including food insecurity, poor access, and socioeconomic burden.

The findings of the current study came in line with **Khodaveisi et al (2019)** study showed the majority of participants had a high dietary adherence in post-teaching program, and the dietary compliance in terms of calories, fat, cholesterol, and sodium intake of the participants in the study group was also significantly better than that of participants in the control group.

Regarding physical activity, the current study illustrated that in pre-intervention phase, most of study subjects had unsatisfactory self-care practice regarding physical activity, while three-quarters of the studied patients in post-intervention phase and more than two-thirds of the studied patients in follow-up phase had satisfactory self-care practice regarding physical activity with highly statistically significant differences between pre- and post-intervention as well as between pre- and follow-up phases (P-value < 0.05), respectively. The results of the current study were supported by **Pinckard et al (2021)** study revealed that two-thirds of participants followed the recommended daily physical activities in satisfying manner.

Regarding pain medication control, the current study showed that there were highly statistically significant differences between pre/post and pre/ follow-up intervention phases of self-care practice concerning pain medication control of the studied subjects. Recently, the risk of chronic opioid use after surgery has been a worldwide concern. These findings could emphasize the need for continuous and professional patient's education about pain management, use of non-opioid medications, and avoidance of taking high-dose opioids to get beneficial post cardiac surgery analgesia and reduce the risk in pain medication control. These findings were supported by **Grant et al (2023)** findings reported that around one-third of patients post operative had high risk of opioid-related adverse events.

Regarding self-relaxation state, the current study showed that there were highly statistically significant differences between pre/post and pre/follow-up phases in self-care practice regarding self-relaxation state of the studied subjects. From researchers' point of view, resilience bundle including self-relaxation techniques showed an effectiveness in helping patients with cardiac surgery to get rid of physical and psychological tension and anxiety.

The findings of the current study were supported by a randomized controlled trial conducted by **Soliman et al (2022)** found a statistically significant difference in mean anxiety score of the participants who practiced progressive muscle relaxation (PMR) sessions throughout three phases (before, after 7 days, and at the end of 14 days) of intervention.

Regarding sleep quality, the current study revealed that in pre-intervention phase, four-fifths of the studied subjects had a poor sleep quality, and this implied that there was a poor postoperative sleep quality among patients with cardiac surgery. The findings of the present study in pre-intervention phase were similar to and consistent with variety of studies such as **Tegegne & Alemnew (2022)** reported that approximately two-thirds of the included (424) postoperative adult patients had poor sleep quality. Meanwhile, in the current study, over three-quarters of the studied patients in post-intervention phase and majority of the studied patients in the follow-up phase had a good sleep quality with statistically significant differences between pre/post and pre/follow-up intervention phases of self-care practice related to sleep quality with P-value < 0.05. According to researchers' opinion, the positive effect of resilience bundle on improving self-relaxation state and relieving tension feeling had enhanced the patients' sleep quality. These results of the present study were aligned with "**Soh et al. (2024)** study revealed that the majority of patients enrolled in relaxation techniques such as progressive muscle relaxation had a statistically significant improvement in sleep quality preceded by a declined tension.

Regarding management of psychological stress, the present study illustrates that the majority of the studied patients had unsatisfactory self-care practice regarding managing psychological stress in the pre-intervention phase, while in post-intervention phase, majority of the studied patients had a satisfactory self-care practice regarding managing psychological stress. Furthermore, the majority of the studied patients had satisfactory self-care practice regarding managing psychological stress in the follow-up phase. These findings with highly statistically significant differences regarding managing psychological stress between pre/post and pre/follow-up phases of the intervention. According to researchers' point of view, resilience bundle included psychological stress relieving strategies as relaxation techniques, which had a positive effect in reducing stress. The findings of the current study were supported by **Mccann et al (2023).** The evidence showed that receiving pre-operative education and having good family relationships resulted in moderate-to-high level reductions in psychological distress. **Regarding correlation between patients' knowledge and self-care practice in the post-intervention study phase,** the findings of the current study show that in the post-intervention phase, there were high statistically significant positive correlations between patients' knowledge and physical activities. The positive correlation in the current study between patients' knowledge and physical activities was in agreement with **Youniss et al (2019)** study where the patients' physical activity and exercises practice improved largely after the patients received instructional guidelines in this regard. Meanwhile, according the findings of the current study, there was high statistically significant negative correlation between patients' knowledge and sleep quality. These findings were in agreement with **Tegegne & Alemnew (2022)** multicenter cross-sectional study on patients after surgery who were selected by a systematic random sampling. A face-to-face interview using PSQI was utilized in data collection.

Conclusion:

In the light of the study findings discussion, it can be concluded that the findings supported the hypotheses of the current study and it was suggested that the patients' mean knowledge scores were higher and patient's self-care practice has been improved after implementing resilience bundle for the studied patients.

Recommendations:

Based on the main findings of the current study, the following recommendations can be deduced:

- Similar study can be repeated by increasing substantially the sample size and possibly a trans-national study in order to further examine the dependability of these results and generalizability.
- However, the current study had found significant results that can be implemented in majority of post cardiac surgery rehabilitation programs all over the country.

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