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Effectiveness of Nursing Instructional Program on Medication Adherence for Patients with Heart Failure

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ABSTRACT

Background: Heart failure (HF) is an important cause of death, first described as an emerging epidemic about 25 years ago. The frequency of HF keeps increasing, despite efforts to stop or delay the beginning of cardiovascular disease. Presently, the overall number of heart failure patients continues to rise due to the ageing and growing populations in certain areas. **Objective:** To evaluate the effectiveness of the nursing instructional program on medication adherence for patients with heart failure. **Methods:** A quasi-experimental design was used. A non-probability purposive sample of 70 patients was selected consisting of a study group that were exposed to the nursing instructional program, and a control group. A well-designed questionnaire consisting of three parts Demographic Data, Clinical Data and Morisky Medication Adherence Scale (MMAS-8) was constructed. **Results:** The study's findings indicated that medication adherence and pre-test scores were not significantly different for the study group from the control group, but post-test medication adherence scores were higher in the study group than the control group. **Conclusion:** The implementation of the instructional session significantly improved medication adherence among patients in the study group compared to the control group. This observed difference highlights the effectiveness of the instructional program in enhancing adherence, underscoring its potential as a targeted intervention for improving patient outcomes. It is necessary to add an instructional and guidance nursing unit to improve health outcomes for heart failure patients by providing an integrated counselling program for all patients.

Keywords: Heart Failure Management; Instructional Program; Medication Adherence

INTRODUCTION

Heart failure remains a significant contributor to mortality, initially identified as a rising epidemic approximately 25 years ago. The ageing and expanding global population is currently driving its prevalence to increase (Coats, 2019). In certain populations (Groenewegen *et al*., 2020), patients with congestive heart failure must adhere to several basic concepts of effective treatment, including patient control of signs and symptoms, self-care management (such as dietary restrictions), and medication adherence (Ahmed & Abd El-Aziz, 2017). Numerous advantages of medication adherence were demonstrated in the literature. According to earlier research, maintaining patients' physiologic capabilities through compliance is crucial for lowering hospitalisation rates. Medication compliance also helps with symptom management, delaying worsening, and enhancing clinical results. Because drugs have a remarkable effect in reducing morbidity and death in heart failure, the American College of Cardiology, the American Heart Association, and the European Society of Cardiology have published guidelines emphasizing the importance of medication adherence (Jarrah *et al*., 2023).

Medication nonadherence leads to increased hospitalisation rates, morbidity, and mortality. Unfortunately, low adherence rates among patients with HF have a severe impact on clinical outcomes and increase the risk of HF exacerbation, decreased physical function, hospitalisation, and death (Ruppar, Delgado & Temple 2015; Rasmussen *et al*., 2021). Different strategies have been tried to improve adherence to medications in heart failure patients, but it is unclear how these interventions will eventually impact the rates of hospital readmission and patient mortality (Ruppar *et al*., 2016). One of the main reasons for poor medication

adherence is patients' lack of understanding of the disease. Therefore, to encourage medication adherence, providers believe that conversations about medication-related difficulties and patient education about the disease and medications are crucial (Mohamed *et al*., 2021).

Nurses can play a significant role in the healthcare system by helping to improve drug adherence. For instance, before prescribing any pharmaceutical regimen, nurses frequently develop a personal relationship with the patients. Patients are more likely to accept nurses' information regarding the advantages and disadvantages of taking their medication as directed when there is a personal connection (Shah *et al*., 2015; Rashidi *et al.*, 2020).

METHODOLOGY

Design of the Study

A quasi-experimental design was implemented in the current study by which the patients are assigned into two groups (experimental and control group). The study has been carried out during the period 1st November 2023 to 1st April 2024.

Setting of the Study

The study was conducted in Al-Najaf City/Al-Najaf Al-Ashraf Health Directorate, at Al-Najaf Center for Cardiac Surgery and Transcatheter therapy. This centre is a specialised centre established in 2011 in Al-Najaf City. Initially, the Al-Sadder Medical City handled its administrative affairs, but in 2014, the Al-Najaf Health Directorate took direct control of them. Established with a capacity of 60 beds, it offers a variety of medical and health services, such as open-heart surgeries and cardiac catheterisation (Diagnostic and Therapeutic).

Sample of the Study

A non-probability (purposive sample) technique was utilised to select patients (80) admitted to Al-Najaf Center for Cardiac Surgery and Transcatheter Therapy. Ten patients were chosen for the pilot study and excluded from the original sample. Seventy patients participate in the current study and were divided into two groups: 35 patients for the experimental group and 35 patients for the control group.

The Study Sample was Selected Based on the following Criteria

Inclusion Criteria

The researcher established specific inclusion criteria to select the study sample. Participants included individuals previously diagnosed with heart failure, aged 18 years or older. To ensure comprehension of the guidance program written in Arabic, only participants of Arab nationality were included. Additionally, the study required alert patients who were able to communicate verbally and make independent decisions.

Excluding Criteria

The exclusion criteria for the study encompassed patients who declined to participate, those who were illiterate and therefore unable to comprehend the Arabic guidance program, and individuals diagnosed with psychiatric disorders.

Sample Size and Power Analysis

The sample size is calculated in the present study based on the power analysis. The G-Power program version 3.1.9.7 was used to determine the sample size as adopted by Grove and Gray (2018).

Statistical Analysis

In clinical trials, statistical power is customarily set to a number greater than or equal to 0.80, with many experts in clinical trials now advocating a power of 0.90. Power is the capacity of the study to discover differences or relationships that exist in the population.

Power Analysis is conducted before the Data Collection

The goal is to help the researcher determine the smallest sample size that is suitable to detect the effect of a

given test at the desired level of significance. Factors such as power, effect size, and level of significance enable the use of this method (Grove, Burns & Gray, 2012). The researcher used the G power program to find the right sample size for this study. They looked at power (95%), significance (0.01), and middle effect size (0.32). Therefore, the sample size is equal to 80.

The Study Instrument

The study instrument and tools were adapted to determine the effectiveness of the nursing instructional program on medication adherence for patients with heart failure, and they consist of the following:

Part 1: Demographic Data

This consists of age, gender, level of education, monthly income, residence, marital status, occupation status and insurance.

Part 2: Clinical Data

This consists of clinical characteristics (BMI, smoking; medical history: chronic diseases, previous surgery, other medication; family history of heart failure, duration of disease, number of physician visits).

Part 3: Morisky Medication Adherence Scale (MMAS-8)

This self-report scale consists of 7 items answered with a yes or no and 1 item with a 5-point Likert scale. The scores of the MMAS-8 range from 0 to 8. The 8-item Morisky Medication Adherence Scale (MMAS-8) is a simple, economic and easy tool to evaluate the medication compliance of chronic disease. This scale was developed by Dr. Donald E. Morisky. The MMAS-8 is an extension of the earlier 4-item Morisky Medication Adherence Scale (MMAS-4) and includes additional items to provide a more comprehensive evaluation of adherence behaviours (Kristinawati, Wijayanti & Mardana, 2023; Sayiner *et al*., 2020; Granger *et al*., 2015).

Validity of the Study Instrument

The validity of an instrument pertains to its capability to accurately measure and collect the specific data it is designed to obtain. A group of experts checks the early version of the questionnaire to see if it is clear, relevant, and good enough to measure the important ideas. This is how face validity is determined. A preliminary copy of the questionnaire is designed and presented to experts (15), who have more than 10 years of experience ($\chi2 = 29$ years).

Reliability of the Study Instrument

Reliability has not been calculated for the study instrument of the present study because the Morisky Medication Adherence Scale (MMAS-8) is a global and stable standard, and there are no suggested modifications made by the experts. Reliability aims to study the phenomenon for the same population at any time in the future (Zhang *et al.*, 2021).

Rating and Scoring

The MMAS-8 is a self-report questionnaire with 8 questions (items) whose wording of the questions/items is formulated to avoid answering "yes" to questions regardless of their content. Items 1 through 7 have response choices of "yes" or "no," whereas the item 8 has 5-point Likert response choices. Each "no" response is rated as "1, and each "yes" is rated as "0, except for item 5, in which each "yes" is rated as "1, and each "no" is rated as "0". Total MMAS-8 scores can range from 0 to 8 and have been categorised into three levels of adherence: high adherence (score = 8), medium adherence (score of 6 to < 8), and low adherence (score < 6).

Statistical Methods

Statistical programs such as SPSS (Statistical Package for Social Science) version 23 and Excel application were used to analyse the data through descriptive data analysis that included frequencies, percentages, in addition to inferential data analysis (Paired *t*-test to assess the significant difference between

pre-test and post-test in one group, and independent *t*-test to assess the significance difference between two groups of measurement).

Ethical Approval

This research received approval from the Ethical Committee of Clinical Studies from the University of Kufa, Iraq with reference number MEC-74 on 12th November 2023.

RESULTS

Table 1 indicates that a high percentage of participants in both groups fall within the age range of 61-70 years, with 54.3% in the study group and 42.9% in the control group. Additionally, the table reveals that the majority of participants in both groups are male, accounting for 68.6% in the study group and 65.7% in the control group. Regarding residence, 77.1% of the study group and 74.3% of the control group reside in rural areas.

In terms of marital status, the majority of participants are married, with 97.1% in the study group and 94.3% in the control group. For monthly income, 65.7% of the study group and 57.1% of the control group report having insufficient income. Concerning educational level, the highest percentage of participants in the study group (71.4%) and in the control group (45.7%) are at the "read and write" level.

Regarding employment status, a large proportion of participants are unemployed, with 88.6% in the study group and 82.9% in the control group. Furthermore, most participants lack health insurance, with 94.3% in the study group and 100.0% in the control group.

Table 1: Distribution of Socio-Demographic Characteristics for both Study and Control Groups

Variables	Categories	Statistics	Groups	
			Control	Study
Age	<= 40.00	Freq.	0	2
		%	0.0%	5.7%
	41.00 - 50.00	Freq.	13	8
		%	37.1%	22.9%
	51.00 - 60.00	Freq.	7	6
		%	20.0%	17.1%
	61.00 - 70.00	Freq.	15	19
		%	42.9%	54.3%
Sex	Male	Freq.	23	24
		%	65.7%	68.6%
	Female	Freq.	12	11
		%	34.3%	31.4%
Level of Education	Read and write	Freq.	16	25
		%	45.7%	71.4%
	Primary	Freq.	7	3
		%	20.0%	8.6%
	Intermediate	Freq.	2	3
		%	5.7%	8.6%
	Secondary	Freq.	2	3
		%	5.7%	8.6%
	Institute	Freq.	6	1
		%	17.1%	2.9%
	College	F.	2	0
		%	5.7%	0.0%
Marital Status	Single	Freq.	0	1
		%	0.0%	2.9%
	Married	Freq.	33	34
		%	94.3%	97.1%
	Separated	F.	2	0
		%	5.7%	0.0%

Variables		Statistics		
Monthly Income	Sufficient	Freq.	7	3
		%	20.0%	8.6%
	Insufficient	Freq.	20	23
		%	57.1%	65.7%
	Some Extent	Freq.	8	9
		%	22.9%	25.7%
Residency	Rural	Freq.	26	27
		%	74.3%	77.1%
	Urban	Freq.	9	8
		%	25.7%	22.9%
Occupation	Employee	Freq.	6	4
		%	17.1%	11.4%
	Unemployed	Freq.	29	31
		%	82.9%	88.6%
Insurance	Yes	Freq.	0	2
		%	0.0%	5.7%
	No	Freq.	35	33
		%	100.0%	94.3%

%= percentage; freq.=frequency

Table 2 shows the distribution of clinical characteristics and manifestations for both the study and control groups.

The highest percentage of body mass for participants in the study group was Normal Weight (51.4%) In contrast, the control group had the highest percentage of participants who were overweight (51.4%).

Regarding smoking, the highest percentage in the study group were previous smokers (48.6%). As for the control group, most participants were non-smokers (62.9%). The table also displays diseases associated with heart failure, revealing that the study group had the highest percentage of participants with high blood pressure (65.7%), whereas the control group had a lower percentage (80.0%). The majority of the participants in both groups did not have a family history of heart failure; their percentage was 74.3%. The table also showed that most of the patients in both groups were using medications other than heart medications; their percentage was (60.0%) in the study group and (68.6%) in the control group, and they had had previous interactions and surgery; their percentage was (68.6%) in the study group and (74.3%) in the control group. The percentage of most participants in the study possessing a duration of disease ≤5, (77.1%) of the study group and (68.6%) of the control group.

Table 2: The Distribution of the Clinical Characteristics and Clinical Manifestations for Experimental and Control Groups

Variables	Categories	Statistics	Groups	
			Control	**Study**
Body Mass Index	Under Weight	Freq.	1	6
		%	2.9%	17.1%
	Normal Weight	Freq.	7	18
		%	20.0%	51.4%
	Overweight	Freq.	18	11
		%	51.4%	31.4%
	Obese	Freq.	8	0
		%	22.9%	0.0%
	Very Obese	Freq.	1	0
		%	2.9%	0.0%
Smoking	Yes	Freq.	10	2
		%	28.6%	5.7%
	No	Freq.	22	16
		%	62.9%	45.7%
	Previous Smoker	Freq.	3	17
		%	8.6%	48.6%

Hypertension	Yes	Freq.	28	23
		%	80.0%	65.7%
	No	Freq.	7	12
		%	20.0%	34.3%
Diabetes Mellitus	Yes	Freq.	16	14
		%	45.7%	40.0%
	No	Freq.	19	21
		%	54.3%	60.0%
Coronary Artery Disease	Yes	Freq.	12	15
		%	34.3%	42.9%
	No	Freq.	23	20
		%	65.7%	57.1%
Arrhythmia	Yes	Freq.	5	1
		%	14.3%	2.9%
	No	Freq.	30	34
		%	85.7%	97.1%
Other	No	Freq.	35	35
		%	100.0%	100.0%
Previous Surgery	Yes	Freq.	26	24
		%	74.3%	68.6%
	No	Freq.	9	11
		%	25.7%	31.4%
Other Medication	Yes	Freq.	24	21
		%	68.6%	60.0%
	No	Freq.	11	14
		%	31.4%	40.0%
Family History of Heart Failure	Yes	Freq.	9	9
		%	25.7%	25.7%
	No	Freq.	26	26
		%	74.3%	74.3%
Duration of Disease	≤ 5	Freq.	24	27
		%	68.6%	77.1%
	6 – 10	Freq.	9	5
		%	25.7%	14.3%
	11+	Freq.	2	3
		%	5.7%	8.6%
Number of Physician Viste	≤ 3.00	Freq.	27	33
		%	77.1%	94.3%
	4.00+	Freq.	8	2
		%	22.9%	5.7%

%= percentage, freq.= frequency

Based on Table 3, patients in the control group were not very good at taking their medicine as prescribed before the study (mean score: 3.2500), and the same was true for patients in the study group (3.0500).

Table 3: Comparison of Patient Adherence Score between Study and Control Groups

Variables	Rating	Statistics	Groups	
			Control	**Study**
Patient Adherence at Pre-Test	Low	Freq.	34	33
		%	97.1%	94.3%
	Moderate	Freq.	1	1
		%	2.9%	2.9%
	High	Freq.	0	1
		%	0.0%	2.9%
		Mean	3.2500	3.0500
		S.D.	1.56243	2.02448
t-Test = 0.463; *df* = 68, *P*-value = (0.1) NS				

% = percentage, Freq. = frequency, df = degree of freedom, S.D.=standard deviation, NS = Non-Significant, HS =Highly Significant

Table 4 shows the overall assessment of patients' adherence to taking the medication after the study; for the control group, adherence is low at the mean score of 3.0786. The study group had moderate adherence, with a mean score of 6.5786.

Table 4: Comparison of Patient Adherence Score of Post-test between Study and Control Groups

Variables	Rating	Statistics	Groups	
			Control	Study
Patient Adherence at Post-Test	Low	Freq.	34	11
		%	97.1%	31.4%
	Moderate	Freq.	1	21
		%	2.9%	60.0%
	High	Freq.	0	3
		%	0.0%	8.6%
	Mean		3.0786	6.5786
	S.D.		1.60854	0.83996
t-Test = (-11.412), *df* = (68), *P*-value = (0.001) S				

% = percentage, freq. = frequency, df = degree of freedom, S.D.=standard deviation, N.S. = Non-Significant, HS =Highly Significant

Limitation

Patients in this study show interest in learning about the disease and medications for their disease, but the study also faced many challenges. Therefore, the current study faces some limitations; one of these limitations is that some patients refuse to spend time with the researcher and prefer to complete the review to the centre as quickly as possible due to the patient's lack of awareness of the importance of the study and the researcher's inability to contact them on a regular basis because there is no specific review schedule for heart failure patients. The relatively short duration of follow-up due to the limited study period is an additional limitation. Future studies should attempt to overcome these limitations

DISCUSSION

The majority of participants are males (Al-Hchaim, Abdullah & Ali, 2018). A study by Jarrah *et al*. (2023) also showed the same result, perhaps due to men's lifestyles, such as smoking and a diet rich in fats, in addition to excess weight and stress, which causes an increase in heart rate and high blood pressure and increases the risk of heart disease. A vast majority are married, because most of the sample is in the age group of 61 years and above, and this explains that most of them are married due to the customs of Iraqi society and early marriage.

The current study indicated that the body mass of participants indicated overweight, and this was shown by Kittan & Hamza (2020). Cardiac patients often experience fatigue during physical exertion, which can lead to reduced motivation for regular exercise and poor adherence to physical activity regimens. This is frequently accompanied by unhealthy dietary habits. As for smoking, the majority of patients are non-smokers. This result is consistent with Abdulhussein and Abd-Ali, (2020), as most of the participants with heart failure were non-smokers. The present study identified hypertension as the most common risk factor associated with heart failure. Several studies (Malik, Begum & Afridi, 2016; Dunlay *et al*., 2011) agreed that high blood pressure that is not well controlled increases the risk of heart failure. When pressure rises to very high levels, the heart is forced to pump blood harder than usual to keep blood circulating in the body. Narrowing and blockage of blood vessels due to high blood pressure increases the risk of heart failure.

Low adherence to medications is one of the reasons why heart failure patients do not survive for more than 5 years (Savarese *et al*., 2023) and more than half are taking medications other than heart failure

medications, because most patients suffer from diseases associated with heart failure and need medication (Zheng *et al.*, 2020). It is consistent with the results of the current study. As for the genetic factor, three-quarters of the patients participating in the study had no family history of heart failure. Heart failure can result from various factors beyond genetics, including chronic conditions such as myocarditis, endocarditis, hypertension, coronary artery disease, congenital heart muscle defects, or heart valve dysfunction (Casas *et al.*, 2021).

The results of the study showed that the study sample had low adherence (Nelson, Pagidipati & Bosworth, 2024; Oh, Kim & Schlenk, 2024; Cheng *et al.*, 2023). Most of the patients did not adhere to their medications during the past two weeks, sometimes due to forgetfulness. Apart from forgetfulness, more than half of the patients cited dissatisfaction with the treatment plan and "not taking any medication when you feel you are under control" as the main reasons for low medication adherence in this study. This is similar to the study by Rezaei *et al*. (2022), where they showed that patients' medication adherence behaviours depended on their perceived emotional states. In both cases, if they felt worse while taking their heart failure medication or felt in control, they were not emotionally satisfied with adhering to their treatment routine. This behaviour can be related to the chronic nature of the disease and low health literacy. The multiplicity and abundance of medications could be the reason for non-adherence to medication, as mentioned by Deaton (2024).

After implementing the instructional program for the study group, the group's commitment rate significantly improved, reaching a moderate level of adherence. Similar to the study, another study by FarzanehRad *et al*. (2024), showed that the rate remained low and showed a further decline in the control group following the implementation of the program. This indicates that educating clients about their illness, recognizing specific symptoms, and understanding the benefits of medications is an effective strategy for improving adherence to prescribed treatments. This aligns with the findings of by Wu *et al.* (2008) and Mahmoud Abd Elaziz, Mustafa and Zaki (2017), which emphasise the importance of patient education in the nursing and medical care plan as well as the patient's implementation of the therapeutic regimen to enhance understanding and adherence.

The study also showed that there is a statistically significant difference between the pre- and post-test with regard to the commitment of the study group. The nursing educational program improved patient adherence, and this study supported other studies that found a big difference in the ability of the study group to take their medications as prescribed for long-term illnesses. A group of previous studies agreed with these results (Mahmoud Abd Elaziz, Mustafa & Zaki, 2017; Ahmed & Abd El-Aziz, 2017; Kittan & Hamza, 2020; Ibraheem, Amin & Allawy, 2023).

CONCLUSION

The results indicate that most participants had poor medication adherence at the pre-test stage. Study showed that the participants had poor medication adherence at the pre-test. However, after implementing the instructional program, the participants demonstrated a significant improvement in their knowledge about medication adherence. These findings highlight the effectiveness of the instructional program in addressing gaps in understanding and promoting better adherence to prescribed regimens.

This study is significant as it emphasises the critical role of patient education in improving health outcomes. Future research could focus on tailoring such programs to specific demographic groups, exploring long-term adherence rates post-intervention, and assessing the impact on clinical outcomes such as disease progression and quality of life. Additionally, integrating technological tools like mobile apps or virtual coaching could further enhance the reach and effectiveness of similar programs.

Conflict of Interest

The authors declare that they have no conflict of interests.

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