Improving medication adherence of patients with heart failure using tele-motivational interviewing

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Abstract. – OBJECTIVE: The patient's self-care behavior encompasses various aspects, including medication adherence, which has been identified as a significant concern in the context of heart failure. To encourage patients in their medication, tele-motivational interviewing can be used. The main aim of this research is to examine the effects of tele-motivational interviewing on medication adherence in individuals who have been diagnosed with heart failure.

MATERIALS AND METHODS: In this research, an experimental pretest-posttest design with a control group was chosen. The study involved the implementation of tele-motivational interviewing, which spanned a duration of two months, with interventions taking place on a weekly basis. To measure medication adherence, the Morisky Medication Adherence Scale (MMAS-8) was employed. In a randomly selected sample of 176 respondents, half were assigned to the experimental group (n=88), and the other half were assigned to the control group (n=88).

RESULTS: Pre-test medication adherence levels for the experimental group indicate that 68 respondents (77.2%) fall into the low category (score >2), whereas post-test medication adherence levels for the same group indicate that 55 respondents (62.5%) fall into the highest category (score 0). The Wilcoxon Signed Rank Test demonstrates the *p*-value to be less than 0.001.

CONCLUSIONS: Tele-motivational interviewing as a skill in education that supports the patients directly and continuously by monitoring during treatment by telephone, gradually changes and affects the patients' behavior. Hence, the utilization of tele-motivational interviewing presents a viable approach for enhancing medication adherence in individuals diagnosed with heart failure.

Key Words:
   Tele-motivational interviewing, Medication adherence, Heart failure.

Introduction

Heart failure is a clinical syndrome that arises due to structural or functional impairments in the ventricular pumping or ejection capacity of the heart[1]. Heart failure, globally, has high morbidity and mortality, with an estimated prevalence of 26 million people. Moreover, it contributes to an increase in the cost of treatment and a high chance of re-hospitalization[2,3]. Early diagnosis and effective treatment play a role in preventing repeated hospitalizations and improving the quality of life[4]. In this regard, adherence to heart failure is a basic thing that must be kept on so that patients' knowledge and enthusiasm are required[5]. Treatment compliance is a patients' behavior in taking drugs according to the dosage, frequency, and time prescribed by health workers. A patient is compliant if 80% of the prescribed drugs have been consumed[6]. Nevertheless, the challenge of undergoing routine treatment requires support with various approaches, including behavior change with motivational interviewing[7].

MI is an intervention to improve one's behavior by increasing the motivation to change and realize self-care management. Self-care management is an action to increase the ability and awareness of self-care independently in order to prevent complications and maintain quality of life[8]. Self-management is associated with an individual's beliefs regarding their capacity to effectively deal with the illness they are facing, their beliefs about their ability to engage in appropriate behaviors, and their beliefs about their capability to achieve significant personal transformation. In this particular scenario, patients have the capacity to undergo the treatment in a compliant manner[9]. MI is helpful for improving some self-care man-

agement, including heart failure treatment[10]. MI is a well-established approach that is grounded in empirical evidence. It aims to effectively address motivation by fostering an individual's rationale for pursuing change and facilitating optimal outcomes throughout the course of treatment[11]. Motivational interviewing correlates to patients' change, ongoing communication, and reduced risky behavior[12]. Moreover, MI is a counseling approach that prioritizes the needs and perspectives of the patient. Its primary objective is to promote behavior modification by assisting individuals in examining and addressing obstacles that hinder their ability to change behaviors throughout the course of treatment[13]. MI has been extensively utilized across diverse technological platforms, including video and telephone modalities, commonly known as tele-motivational interviewing[14]. Tele-motivational interviewing (TMI) focuses on self-care management, one of which is adherence to non-judgmental treatment which is easier to be accepted by individuals[15,16].

Tele-motivational interviewing, a telephone-based motivational interviewing, is carried out during treatment to improve self-care by monitoring and coordinating the nurses and the patients during home care[17]. Aligned with the tenets of the chronic disease treatment paradigm, TMI has the capacity to alleviate symptoms and enhance self-management behaviors and knowledge pertaining to chronic ailments. Therefore, the main aim of this research is to evaluate the effectiveness of TMI in enhancing compliance among patients diagnosed with heart failure during their home-based treatment protocol.

Materials and Methods

Types of Research

Quantitative research, true experimental pre-test-post-design with the control group, was conducted on 88 experimental and 88 control group respondents. The experimental group respondents took the pre-tests, did motivational interviewing in person and over the phone, and took post-tests. Meanwhile, the control group only took pre-test and post-test.

Types of Participants

In determining the respondents, the researchers considered several provisions that could be involved in the study: patients with heart failure aged more than 18 years, patients with heart failure with a classification degree II and III,

and patients with heart failure who were undergoing heart failure treatment. On the other hand, this study had some exceptions: patients with heart failure who could not participate in the series of studies until it was completed and patients with heart failure who changed phone numbers, so that they no longer participated.

Types of Interventions

The educational and motivational program presented in motivational interviews is counseling to encourage behavior change using interventions by providing verbal education and motivation about self-care management for heart failure patients, especially in the problem of overcoming medication non-adherence. In the motivational interviewing, there were several interventions: the purpose of treatment, medications, drug control, treatment side effects, and strategies to prevent non-compliance. The researchers then conducted smartphone-based motivational interviews for 60 days with a frequency of calls once a week on Sunday to monitor whether the experimental group respondents adhered to their treatment after a motivational interview. This smartphone-based motivation was carried out in the second week after the pre-test. When the call was made, the researchers began to monitor the progress of the respondent's health and then assisted the respondents' treatment for the whole week to determine whether the respondent was compliant in taking the drugs. Finally, the researchers provided motivation and education so that the respondents complied with the medications. The study was conducted from August 2021 to April 2022, while the data were collected in February 2022, as presented in Table I.
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Sample Size

The samples were determined based on the total population of 1,114 from January 2021 to December 2021 at UNS Hospital. This study involved a randomized controlled trial (RCT) in a single-blind manner. Figure 1 depicts the flow chart of participants.

Randomization Types (Sequence Creation, Deployment)

Randomization procedure: The respondents involved in this study were previously identified according to the inclusion criteria. The respondents were then expelled if they were considered to have the exclusion criteria. The randomization procedure

Table I. The active compounds and their properties.

Week	Activities in the experimental group	Activities on control group
Week 1	Identifying patient treatment adherence levels through pre-tests and conducting motivational interviewing	Identifying the adherence level of the patients' treatment through the pre-test
Week 2-Week 9	Conducting tele-motivational interviewing via phone and WhatsApp on the scheduled day and asking the respondents to fill out the monitoring sheet	-
Week 10	Evaluating the adherence level after the post-intervention treatment and motivational interviewing	Identifying the adherence level of the patients' treatment through the post-test

Table II. Characteristics of the respondents.

	Experimental group		Control group	
Characteristic	N	%	N	%
Age				
26-35	1	1.1	4	4.5
36-45	5	5.7	13	14.8
46-55	19	21.6	25	28.4
56-65	28	31.8	28	31.8
66-75	30	34.1	26	18.2
76-85	5	5.7	2	2.3
Gender				
Male	49	55.7	45	51.1
Female	39	44.3	43	48.9
Recent Education				
Not Attending School	5	5.7	5	5.7
Elementary	18	20.5	16	18.2
Junior High	15	17.0	26	29.5
Senior High	29	33.0	19	21.6
College	21	23.9	22	25.0
Occupation				
Jobless/Housewife	59	67	38	43.2
Self-employed	22	25	33	37.5
Civil Servant	4	4.5	15	17.0
Farmer	3	3.4	2	2.3
Period				
1-5 years	72	81.8	49	55.7
6-10 years	12	13.6	26	29.5
11-15 years	2	2.3	8	9.1
16-20 years	2	2.3	5	5.7
Comorbidities				
None	21	23.9	26	29.5
DM	23	26.1	33	37.5
Hypertension	44	50.0	24	27.3
Hyperthyroidism	0	0	5	5.7
NYHA Classification				
NYHA II	77	87.5	58	65.9
NYHA III	11	12.5	30	34.1

was performed using a 1:1 randomization number scheme divided equally into experimental and control groups. After that, the researcher conducted a random selection to determine the respondent group. The experimental group got an odd number, and the control group received an even number.
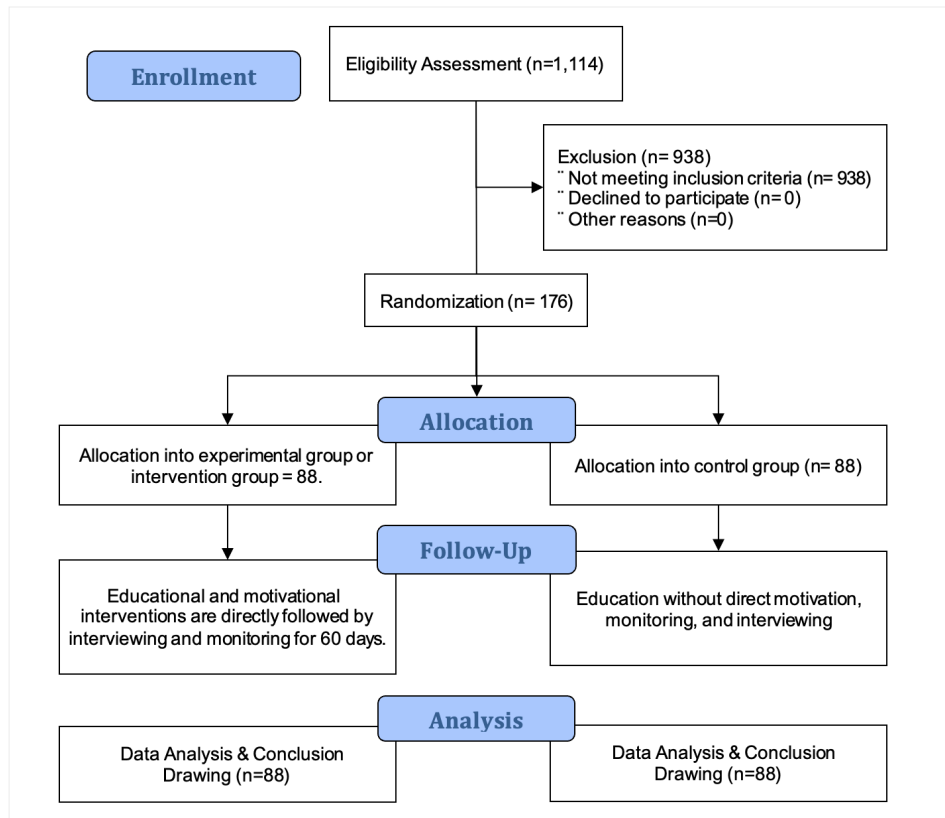
Figure 1. CONSORT 2010 flow diagram.

Application: After respondents were randomly assigned to groups, the researchers were assisted by two enumerators to explain the study's purposes. In this study, the researchers obtained written consent approved by the respondents. This study's respondents were patients carrying out routine control at the outpatient installation of UNS Hospital. The researchers then carried out the provision of interventions in the experimental group directly.

Types of Measuring Results

The questionnaires in this study were used as the measuring tool to determine changes in the respondents' behavior in adherence to their treatment. The questionnaires were on demographic data characteristics and the Morisky Medication Adherence Scale (MMAS-8) to measure treatment adherence. The score to show high compliance was 0, moderate compliance was 1 or 2, and low compliance was >2.

Types of Statistics

Statistical analysis, with univariate tests and frequency distributions, was utilized to describe the characteristics of each variable. The normality of the data was assessed using the Kolmogorov-Smirnov test, while the homogeneity of variances was examined using the Levene test. Additionally, the Wilcoxon test was employed as a non-parametric statistical test to assess the disparity between the two groups. This decision was made based on the assumption that the data did not follow a normal distribution and exhibited heterogeneity. The significance level was set at a p-value of less than 0.05. As a result, the alternative hypothesis (Ha) was accepted, while the null hypothesis (Ho) was rejected. The software used in this research was IBM SPSS 26.0 version. The present study obtained ethical approval from the Ethics Commission of Dr. Moewardi Hospital on December 16th, 2021.

Table III. The overview of average value of the treatment adherence rate.

Mean	Median	Mode	Std deviation	Minimum	Maximum
Experimental Group					
Pre-test	3.80	4	3	2.091	8
Post-test	0.60	0	0	0.918	3
Control Group					
Pre-test	3.69	3	1	2.108	8
Post-test	3.67	3	1	1.987	8

Results

Baseline Data

According to Table II, the experimental and control groups, each of which has 88 respondents, are split based on the respondents' distribution of demographic characteristics. In the experimental group, the majority of the respondents (30) were 66 to 75. (34.1%). In contrast, the 28 respondents in the control group were mostly between 56 and 65 (31.8 %).

In both groups, the percentage of male patients in the analysis results based on gender was comparable. A total of 55.7%, or 49 respondents, were in the experimental group, compared to 51.1%, or 45 respondents, in the control group.

Based on the level of education, the frequency distribution demonstrated that the experimental group was dominated by high school graduates (29 respondents or 33%), while the control group was dominated by junior high graduates (26 respondents or 29.5%).

Regarding the frequency distribution based on occupation, both groups' respondents were dominated by jobless/homemakers, 59 or 67% of respondents of the experimental group and 38 or 43.2% of respondents of the control group.

In the experimental group, 72 respondents (81.8%) were reported to have heart failure for one to five years, while there were 49 respondents (55.7%) in the control group.

Concerning the comorbidities, each group had a different frequency distribution. Most respondents, 44 respondents (50%) of the experimental group, suffered from hypertension, while most respondents, 33 respondents (37.5%) of the control group, suffered from DM.

The frequency data based on the NYHA classification illustrated that most experimental and control group respondents belonged to NYHA II. In the experimental group, there were 77 respondents (87.5%). Meanwhile, in the control group, there were 58 respondents (65.9%) (Table III).

The data presented in Table III provides insights into the statistical characteristics of respondents' compliance levels. This information is utilized to elucidate the reasons behind the experimental group's average pre-test value (mean) of 3.80, median of 4, mode of 3, standard deviation of 2.91, and range spanning from 0 to 8. On the other hand, the results of the post-test indicate a mean value of 0.60, a median value of 0, a mode value of 0, a standard deviation of 0.918, a mini-

Table IV. The frequency distribution of the treatment adherence rate result categories.

	Experimental Group		Control Group	
Category	N	%	N	%
Pre-test				
High	2	2.3	1	1.1
Medium	18	20.5	26	29.5
Low	68	77.3	61	68.3
Post-test				
High	55	62.5	1	1.1
Medium	26	29.5	21	23.9
Low	7	8.0	66	75.0

Table V. Kolmogorov-Smirnov Normality Test.

Group	*p*-value	Information
Experimental Group		
Pre-test	0.002	Non-Normal
Post-test	0.000	Non-Normal
Control Group		
Pre-test	0.000	Non-Normal
Post-test	0.000	Non-Normal

Table VI. Levene's homogeneity test.

Group	Sig. Levene's Test	Information
Experimental Group	0.000	
		Non-Homogeneous
Control Group	0.000	Non-Homogeneous

mum value of 0, a maximum value of 3, and an average (mean) value of 0.60.

In contrast, the statistical data pertaining to the respondents in the control group reveals that the mean pre-test value is 3.69, the median value is 3, the mode is 1, the standard deviation is 2.108, the minimum value is 0, and the maximum value is 8. In the experimental group, the post-test value (mean) is 3.67, with a median of 3 and a mode of 1. The standard deviation is 1.987, while the lowest value (minimum) observed is 0 and the highest value (maximum) is 8 (Table IV).

The frequency distribution results in the category of treatment compliance are best illustrated in Table IV. Pre-test results for the experimental group reveal that 68 respondents (77.3%) are in the low category, and the results for the control group, which has 61 respondents, are similar (68.3%). In contrast, the post-test demonstrates that 66 respondents (or 75%) from the control group are categorized into the low category, whereas the experimental group's level of treatment adherence shows that 55 respondents (62.5 percent) are in the high category.

Normality Test

Table V exposes most normality test results using the Kolmogorov-Smirnov Test. For Asymp. Sig (2-tailed) pre-test, the experimental group's value was 0.002 and the control group's value was 0.000. Meanwhile, Asymp.Sig (2-tailed) post-test in the experimental group was <0.001, and the control group was <0.001. Hence, the data were not normally distributed with a Sig. value of <0.05.

Homogeneity Test

The majority of homogeneity test results with a Levene's test signification value (Sig.) of <0.05 are illustrated in Table VI. As a result, there were disparities in the data variations between the experimental and control groups (heterogeneous data).

Bivariate Test

Table VII shows that most results of the hypothesis analysis using the Wilcoxon Signed Rank Test were significant, with a value of 0.001 < *p*-value in the experimental group and 0.877 > *p*-value in the control group. Thus, Ha is accepted, indicating an influence of motivational interviewing on treatment adherence in the experimental group. On the other hand, Ha was rejected, meaning that it could not influence the provision of motivational interviewing on treatment adherence to the control group.

Outcomes and Estimations

Analysis of the primary results

For the changes in the average level of treatment adherence in the primary output before and after the intervention based on the frequency distribution with a pre-test, most of them were from a low category in the experimental group, 77.3% (68 respondents), and in the control group, most of them were mostly in the high category, with 62.5% (55 respondents) in the experimental group and mostly in the low category, and 75% (66 respondents) in the control group.

Analysis of the secondary results

Behavior changes in the experimental group during the follow-up period resulted in significant changes: 1) the respondents have complied with punctuality, dosage, and frequency; 2) the respondents also said that they did not forget the medication when traveling since the monitoring sheet was given; and 3) the respondents also understood what was explained in the intervention. Conversely, the control group had no significant change in behavior.

Table VII. Wilcoxon signed rank test.

Group	*p*-value	Information
Experimental Group	0.001	Influence Found
Control Group	0.877	No Influence

Discussion

Non-compliance with treatment is a major health problem and can compromise the effectiveness of therapy and produce non-optimal clinical outcomes[18,19]. Drug adherence can be further assessed by measuring medication behavior. This scale includes seven yes/no questions and one question with a Likert type[20]. In this case, tele-motivational interviewing improves compliance measured categorically with MMAS-8 questionnaires in the experimental and the control groups. The results of this study suggest that the experimental group exhibits more significant levels of treatment adherence in comparison to the control group.

Moreover, the efficacy of interventions can be ascertained through the active engagement of patients in the treatment process. MI is a clinical counseling approach that is employed by trained professionals in interventions. MI was originally designed to target addictive behaviors, such as substance abuse. This approach employs techniques such as reflective listening, open-ended questions, and affirmations, all of which aim to prioritize each respondent's autonomy. By fostering an individual's internal motivation to modify their behavior, MI seeks to facilitate positive change[21]. Here, MI has been found to improve adherence to treatment for various diseases, such as diabetes and hypertension. MI can also serve as an interventional technique aimed at enhancing patients' motivation to engage in their treatment[22,23].

Medication adherence refers to the practice of adhering to prescribed medication regimens and consistently utilizing them as directed. Adherence to prescribed medications is associated with improved health outcomes, reduced emergency room utilization, decreased hospital admissions, lower mortality rates, and decreased healthcare expenditures[24]. Treatment adherence refers to the health-related actions undertaken by patients in accordance with the mutually agreed-upon plan established by healthcare professionals, which involves the timely and consistent consumption of prescribed medications. Motivational interviewing is a technique that can evaluate a patient's preparedness to engage in behavioral changes through the utilization of targeted skills and strategies that aid the patient in the process of decision-making.

The same research demonstrates that MI improves self-care for chronic HF patients from specialized clinics. MI aims to facilitate behavioral change by promoting commitment through a persuasive and supportive methodology[25,26].

The technique under consideration is characterized by its simplicity and affordability, drawing upon cognitive principles that encompass problem comprehension and associated emotional responses. The objective of this study is to explore potential strategies for altering cognitive processes, implementing effective remedies, and suggesting personalized therapeutic approaches to enhance adherence to treatment[25,27].

Prior studies[28] have shown that the utilization of the motivational interviewing communication model, which is based on the Health Belief Model, has a notable influence on medication adherence and treatment outcomes in individuals who have been diagnosed with pulmonary tuberculosis. Motivational interviewing has demonstrated efficacy as an intervention strategy for clients, yielding favorable outcomes in terms of medication adherence and treatment success. Particularly, it proved to be effective in addressing instances of reduced adherence throughout various stages of behavior change[25,28].

Further research provides evidence to support the assertion that motivational interviewing plays a substantial role in medication adherence. This is demonstrated by the effectiveness of motivational interviewing as a client-centered approach in promoting medication adherence, reducing average blood pressure levels, and enhancing self-efficacy among individuals diagnosed with hypertension[29]. In these circumstances, the inclusion of nurses in the delivery of MI is anticipated to enhance the relationship between patients and the healthcare team, as well as enhance the healthcare system's capacity to offer educational and motivational counseling sessions to individuals with hypertension[29,30].

Tele-motivational interviewing in adherence treatment is also designed to improve behavior change by stimulating motivation to change using an approach[10,31]. Multiple MI principles center around the concepts of compassion, fostering self-efficacy, promoting acceptance of opposing viewpoints, and utilizing conflicts between current actions and personal goals as learning opportunities[32]. To the authors' knowledge, there is currently no existing study that has employed the latest quantitative analysis techniques to investigate the associations between Medication Adherence and Tele-Motivational Interviewing. This is considered a valuable contribution to the nurse's treatment quality. Using motivational interviewing can provide structure when the intervention is carried out to increase the size of treatment adher-

ence[33]. In addition, tele-motivational interviewing has been applied to treat various health-related behaviors[34,35].

Tele-motivational interviewing has practical implications for increasing heart failure patients' medication adherence. Concurrently with the development of a favorable and supportive environment, medication adherence can be enhanced in a brief period of time. In the interim, it is suggested that the quality of care and medication adherence be improved by other means.

Limitations

In this study, researchers have not taken into account differences in medication adherence based on the number of drugs ingested and the side effects of each type of drug. The number of drugs and types of drugs ingested will affect the results of treatment adherence, making the trials used to calculate the level of adherence imprecise.

Conclusions

Tele-motivational interviewing has emerged as a valuable skill in the realm of patient-centered communication, as it has been substantiated by evidence demonstrating its capacity to positively impact patient outcomes. The incorporation of tele-motivational interviewing within the treatment program has the potential to enhance behavior change by augmenting the patient's intrinsic motivation. Further, tele-motivational interviewing focuses on improving self-care management, including patient medication adherence. In this case, providing education and support to patients directly by telephone and continuously monitoring during treatment will gradually change and affect the patients' behavior. Consequently, individuals diagnosed with heart failure who engage in optimal self-care management are likely to experience improved quality of life, reduced mortality rates, and decreased likelihood of recurrence.

Authors' Contributions
Concept & Research Question: Beti Kristinawati, Nove Wiand Dwi Wijayanti; Conducting Research: Beti Kristinawati, Nove Wiand Dwi Wijayanti, Nyofan Wahyu Mardana; Statistical Analysis: Nove Wiand Dwi Wijayanti, Nyofan Wahyu Mardana; Report Writing: Beti Kristinawati, Nove Wiand Dwi Wijayanti, Nyofan Wahyu Mardana.

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Data Availability Statement
All datasets generated or analyzed during this study are included in the manuscript.

Ethical Approval
This research has been approved by the Health Research Ethics Committee of Dr. Moewardi General Hospital in Indonesia (No. 1.076/XII/HERC/2021).

Informed Consent
Before enrolment, all subjects have signed informed consent.

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