



# Predictors of non-adherence to treatment recommendations in a group of elderly patients with heart failure and frailty syndrome admitted to an emergency department

Predyktory nieprzestrzegania zaleceń terapeutycznych w grupie pacjentów w podeszłym wieku z niewydolnością serca i zespołem kruchości przyjętych na szpitalny oddział ratunkowy

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## Abstract

**Introduction and Objective.** Heart failure (HF), the most common cardiovascular condition, is a major challenge in an aging society. The aim of the study was to analyze the occurrence of frailty syndrome and adherence to therapeutic recommendations in elderly patients with HF hospitalized in a hospital emergency department (ED). The study also aimed to identify predictors of non-adherence to treatment recommendations in this group.

**Materials and Method.** 110 heart failure patients hospitalized in ED were surveyed. The Adherence in Chronic Diseases Scale (ACDS) scale and the Tilburg Frailty Indicator (TFI) were used.

**Results.** Almost one in 4 patients (n=24; 21.8%) demonstrated low adherence to the prescribed treatment recommendations, while 60% of subjects (n=66) showed intermediate levels of adherence. The presence of frailty syndrome was observed in more than half of the patients (n=76; 69.1%). The higher the levels of frailty in the physical, psychological and social domains, the lower the level of treatment adherence. The predictors of non-adherence to treatment recommendations included the psychological components of frailty and the number of hospitalizations for heart failure exacerbations in the past 2 years. Regression analysis shows that the greater the severity of psychological frailty and the greater the number of hospitalizations, the lower the ACDS score, and thus the worse the adherence to treatment recommendations.

**Conclusions.** Psychological support should be provided to patients to maintain motivation and adherence to the treatment process. The role of the family and family physician in the prevention of HF decompensation and rehospitalization of these patients should be emphasized.

## Key words

heart failure, aged, frailty, treatment adherence

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## Streszczenie

**Wprowadzenie i cel pracy.** Niewydolność serca (HF), będąca najczęstszym schorzeniem sercowo-naczyniowym, jest głównym wyzwaniem w starzejącym się społeczeństwie. Celem badania była analiza występowania zespołu słabości i przestrzegania zaleceń terapeutycznych u pacjentów w podeszłym wieku z HF hospitalizowanych w szpitalnym oddziale ratunkowym (SOR). Nasze badanie miało na celu w szczególności identyfikację predyktorów nieprzestrzegania zaleceń terapeutycznych w tej grupie.

**Materiał i metody.** Przeprowadziliśmy ankietę wśród 110 pacjentów z niewydolnością serca hospitalizowanych w SOR-ze. Do jej skonstruowania zastosowane zostały skale Adherence in Chronic Diseases Scale (ACDS) i Tilburg Frailty Indicator (TFI).

**Wyniki.** Prawie jeden na czterech pacjentów (N = 24; 21,8%) wykazywał niski poziom przestrzegania zaleceń terapeutycznych, podczas gdy 60% badanych (N = 66) przestrzegało ich w stopniu średnim. Obecność zespołu słabości zaobserwowano u ponad połowy pacjentów (N = 76; 69,1%). Im wyższy poziom słabości w sferze fizycznej, psychicznej i społecznej, tym niższy poziom przestrzegania zaleceń. Predyktory nieprzestrzegania zaleceń terapeutycznych obejmowały psychiczne komponenty słabości i liczbę hospitalizacji z powodu zaostrzeń niewydolności serca w ciągu ostatnich 2 lat. Analiza regresji wykazała, że im większe nasilenie słabości psychicznej i im większa liczba hospitalizacji, tym niższy wynik ACDS, a tym samym mniejsze przestrzeganie zaleceń dotyczących leczenia.

**Wnioski.** W celu utrzymania motywacji i przestrzegania procesu leczenia pacjentom należy zapewnić wsparcie psychologiczne. Warto podkreślić rolę rodziny i lekarza rodzinnego w zapobieganiu dekomensacji HF i ponownej hospitalizacji tych pacjentów.

## Słowa kluczowe

osoby starsze, niewydolność serca, zespół kruchości, przestrzeganie zaleceń terapeutycznych

## INTRODUCTION

Heart failure (HF) is one of the biggest challenges for the current health care system, not only within Poland, but worldwide. According to the Global Burden of Disease Study the number of people with HF has been increasing rapidly. Between 1990–2017, the number of people diagnosed with heart failure nearly doubled in a global follow-up. However, in Poland, a threefold increase in the incidence of the disease has been observed [1].

Despite the ongoing advancement of medical science and the advent of numerous sophisticated therapeutic modalities for HF, the prevalence of hospitalizations due to acute exacerbations of this disease remains considerable [2]. In Poland, the rehospitalization rate for HF patients is approximately 1 in 4 within a month of discharge from hospital. In contrast, among patients over the age of 65, heart failure is the most common reason for hospitalization [3]. Between 2020 – 2021, a significant increase in HF patient visits to Hospital Emergency Departments (EDs) was observed. These visits amounted to over 35,000 per year, which was an increase of almost 10,000 per year compared to previous years [4].

Many of the repeated hospitalizations of people with heart failure could have been avoided. The most frequently reasons for readmission of these patients include comorbidities, inadequate self-management, and noncompliance with treatment recommendations. Therefore, health education should be a fundamental element in the prevention of subsequent hospitalizations of HF patients. It is important to note, however, that the implementation of effective education is limited in some patients. This is influenced by their older age which is often associated with limitations in the cognitive sphere, as well as disorders of the senses of hearing and vision, as well as depressive symptoms [5]. Furthermore, the prevalence of frailty syndrome (FS) is rising among elderly patients with heart failure [6]. The syndrome is characterized by a reduction in physiological reserves and diminished resilience to stressors encountered in daily life. It should be noted that the old age of patients is not synonymous with the presence of frailty syndrome, although the continued aging of the population may increase the incidence of FS [7]. The development of frailty syndrome is influenced by a number of factors, including a sedentary lifestyle, obesity, a history of multiple hospitalizations, smoking, divorce or separation, and widowhood [8].

A more detailed analysis of the data reveals that frailty syndrome occurs in at least half of patients with heart failure (HF), with a significantly higher prevalence in females. In fact, the risk of developing frailty syndrome in women with HF is as much as 26% higher than in men with the same condition. The coexistence of HF and FS has been linked to an increased prevalence of cardiovascular device implantation and an elevated risk of mortality, both from cardiovascular decompensation and from the exacerbation of concomitant diseases. Furthermore, the prevalence of depressive disorders and cognitive impairment is markedly elevated in patients with heart failure (HF) and concomitant functional status (FS), compared to those with HF alone. Furthermore, the number of hospital readmissions has increased significantly. This may be attributed to deficiencies in the physical domain, which impede the ability of such patients to achieve a satisfactory state of health following an exacerbation of heart failure. Limitations in independent functioning also result in non-adherence to treatment recommendations. The

coexistence of FS and HF is associated with a notable decline in the quality of life of patients [9, 10].

In order to provide optimal care for patients with heart failure and concomitant frailty syndrome, it is essential to establish a multidisciplinary team to develop the most beneficial therapeutic recommendations. In addition to prolonging patients' lives, these recommendations should focus on improving the quality of life and preventing the development of disability. It is essential that all aspects of the patient's life be considered, beginning with the implementation of an appropriate nutritional treatment plan, the management of comorbidities, and concluding with the early detection of cognitive impairment and the provision of psychological support [11]. It is essential to foster a high level of therapeutic adherence in these patients, as this is a key factor in preventing readmissions. The most crucial therapeutic recommendations for patients with heart failure (HF) are the regular administration of prescribed medications. A review of the literature reveals that approximately 50% of patients with heart failure adhere to the recommended medication regimen. The primary reasons for non-adherence to medication regimens are forgetfulness due to being away from home and the perception of improvement in symptoms. The regular administration of medication has been demonstrated to have a beneficial effect on the reduction of symptoms associated with heart failure, including shortness of breath and swelling of the extremities. Furthermore, it has been shown to significantly reduce the risk of a cardiovascular incident and death for the patient. It is therefore crucial to maintain continuous surveillance of adherence to therapeutic recommendations, which represent a pivotal aspect of self-care for patients with heart failure [12–14].

## OBJECTIVE

The main aim of the study was to analyze the occurrence of frailty syndrome and adherence to therapeutic recommendations in elderly patients with heart failure hospitalized in hospital emergency department. In particular, the study aimed to identify predictors of non-adherence to treatment recommendations in this group of patients.

## MATERIALS AND METHOD

**Study design and setting.** The observational study was conducted among patients of the emergency department of the Regional Specialized Hospital in Wrocław between October 2023 – March 2024. The Director of the Regional Specialized Hospital provided written approval for the research to be conducted. The research proposal was also reviewed and approved by the Research Ethics Committee at Opole University (Approval No. 9/2023). Strengthening the Reporting of Observational Studies in Epidemiology were followed. The study was conducted in accordance with the principles of the Helsinki Declaration.

**Participants.** The study used a non-probabilistic sampling method. Inclusion criteria: age over 60, diagnosed heart failure, full logical contact with the patient, and consent to participate in the study. Individuals with severe general conditions, visual impairments that impeded their ability to

complete the questionnaire, and those exhibiting a lack of logical communication, e.g. under the influence of alcohol or experiencing an acute phase of mental illness, were excluded from the study.

The study population consisted of 110 patients, 46 women (41.8%) and 64 men (58.2%), hospitalized in the emergency department. The age range for all subjects was 60–91 years ( $M = 72.80$ ;  $SD = 7.38$ ). The ACDS questionnaire score was used to distinguish between 2 groups: those who demonstrated therapeutic adherence and those who did not. In the study sample, 86 individuals (78.2%) demonstrated compliance with therapeutic recommendations, while 24 individuals (21.8%) demonstrated non-compliance with such recommendations. The majority of respondents ( $n=65$ ; 59.1%) reported a net monthly household income of at least 2,101 PLN. In terms of traumatic experiences encountered over the

past year, nearly 1 in 4 respondents ( $n=27$ ; 24.5%) reported the death of a loved one, 50.9% ( $n=56$ ) faced a significant health challenge themselves, and 9.1% ( $n=10$ ) were affected by a serious illness in a loved one. The vast majority of respondents ( $n=101$ ; 91.8%) expressed satisfaction with their home environment (Tab. 1).

**Data sources/measurement – Adherence in Chronic Diseases Scale (ACDS).** A scale designed to assess patients' adherence to treatment recommendations. The scale comprises 7 questions, with respondents provided with 5 response options. The questions are designed to assess direct behaviours that determine adherence to medical recommendations. Additionally, they are intended to evaluate attitudes and situations that may indirectly affect adherence or non-adherence to therapeutic recommendations. The questionnaire allows

**Table 1.** Socio-demographic profile of respondents.

Variables	Categories/Statistics	Total (n = 110)		Adherent patients (n = 86)		Non-adherent patients (n = 24)	
		n	%	n	%	n	%
Gender	Women	46	41.8%	34	39.5%	12	50.0%
	Men	64	58.2%	52	60.5%	12	50.0%
Age	M	72.80		73.16		71.50	
	SD	7.38		7.32		7.63	
	Me	72.00		72.00		70.50	
	Min.–Max.	60.00–91.00		60.00–91.00		60.00–90.00	
Marital status	Married/living with partner	62	56.4%	52	60.5%	10	41.7%
	Single	6	5.5%	2	2.3%	4	16.7%
	In separation/divorced	7	6.4%	3	3.5%	4	16.7%
	Widow/Widover	35	31.8%	29	33.7%	6	25.0%
Country of birth	Poland	108	98.2%	86	100.0%	22	91.7%
	Ukraine	1	0.9%	0	0.0%	1	4.2%
	Russia	1	0.9%	0	0.0%	1	4.2%
Education	None or primary	14	12.7%	7	8.1%	7	29.2%
	Secondary	84	76.4%	67	77.9%	17	70.8%
	High	12	10.9%	12	14.0%	0	0.0%
Monthly net household income	1201–1500 PLN	5	4.5%	2	2.3%	3	12.5%
	1501–1800 PLN	20	18.2%	14	16.3%	6	25.0%
	1801–2100 PLN	20	18.2%	19	22.1%	1	4.2%
	2101 PLN and more	65	59.1%	51	59.3%	14	58.3%
Death of a loved one	Yes	27	24.5%	22	25.6%	5	20.8%
	No	83	75.5%	64	74.4%	19	79.2%
Severe illness in oneself	Yes	56	50.9%	36	41.9%	20	83.3%
	No	54	49.1%	50	58.1%	4	16.7%
Severe illness in a loved one	Yes	10	9.1%	9	10.5%	1	4.2%
	No	100	90.9%	77	89.5%	23	95.8%
Divorce or termination of an important relationship	Yes	1	0.9%	1	1.2%	0	0.0%
	No	109	99.1%	85	98.8%	24	100.0%
Car accident	Yes	1	0.9%	1	1.2%	0	0.0%
	No	109	99.1%	85	98.8%	24	100.0%
Satisfaction with home environment	Yes	101	91.8%	83	96.5%	18	75.0%
	No	9	8.2%	3	3.5%	6	25.0%

M – mean; SD – standard deviation; Me – median; Min. – minimum; Max. – maximum

for the scoring of patients from 0–28 points. It is assumed that the higher the score, the more the patient adheres to the doctor's recommendations. A patient with a score of 0–20 is considered as a patient who does not adhere to recommendations; a score of 21–26 points indicates a moderate level of adherence to recommendations, while a score of 27–28 points indicates a high level of adherence to treatment recommendations [15].

Non-adherent patient – a patient who achieved between 0–20 points in ACDS. Adherent patient – a patient whose score was medium (21–26 points) or high (27–28 points in ACDS).

**Tilburg Frailty Indicator (TFI).** Developed by Gobbens for the objective and consistent evaluation of frailty syndrome on a global scale. Its distinctive advantage lies in its capacity to consider not only the physical domain but also the mental and social spheres, in contrast to other assessment instruments that may be limited in this regard. TFI is comprised of 2 sections: A and B. Section A is concerned with the factors that contribute to the development of frailty syndrome. It seeks to identify and characterize socio-demographic factors, including gender, age, education, marital status, household economic situation, the presence of chronic diseases, and exposure to recent stressful situations that may influence the onset of frailty syndrome. Section B comprises 15 questions focusing on the constituent elements of frailty. The questions in this section are organized into 3 domains: physical, psychological, and social. A response of 'yes' or 'sometimes' is assigned a value of 1, while a response 'no' is assigned a value of 0. A maximum of 8 points can be obtained in the physical domain, 4 points in the psychological domain, and 3 points in the social relations domain. The total frailty score ranges from 0–15. An individual is considered to be frail if the total TFI score is 5 or higher. It should be noted that the maximum scores refer to the highest level of frailty [16].

**Self-administered questionnaire.** The questionnaire comprised of 17 questions which included demographic data (e.g., age, gender), anthropomorphic measurements (e.g., weight, height), number of medications taken per day, presence of chronic comorbidities, rationale for the patient's admission to the emergency department, number of hospitalizations within the past 2 years due to heart failure exacerbations, and other pertinent details. Additionally, the New York Heart Association (NYHA) classification system was employed to ascertain the severity of heart failure symptoms.

**Statistical methods.** The IBM SPSS Statistics 29 package was used for all statistical analyses, which included frequency analysis, analysis of basic descriptive statistics (Shapiro-Wilk test), Pearson's r correlation analysis, Spearman's rho correlation analysis, Student's t test for independent samples, Mann-Whitney U test, and regression analysis. Regression analysis was conducted using the progressive entry method, whereby the level of adherence to treatment recommendations (ACDS score) was predicted based on indices of frailty (3 scales on the TFI questionnaire) and socio-demographic and health factors. The normality of the distribution of the variables was evaluated through the implementation of the Shapiro-Wilk test. The results of the Shapiro-Wilk test indicated a statistically significant deviation from the normal distribution for all variables, except the number of medications taken on a daily. This indicates that the distributions of these variables did not align with the normal distribution. It is noteworthy that for each of these variables, the absolute value of the skewness did not exceed 2. This indicates a slight degree of asymmetry in the distributions. Consequently, parametric tests were employed for the analyses, provided that their other assumptions were satisfied. The significance level was set at  $\alpha = 0.05$ .

## RESULTS

**Health profile of participants.** The vast majority of respondents ( $n=105$ ; 95.5%) were affected with an additional chronic disease in conjunction with their heart failure (multimorbidity). A minority of patients ( $n=40$ ; 36.4%) reported experiencing social isolation as a result of their condition. The majority of participants ( $n=59$ ; 53.6%) engaged in regular weight monitoring, and 88.2% ( $n=97$ ) engaged in regular blood pressure monitoring. Only 36.4% ( $n=40$ ) followed the dietary recommendations they received. The vast majority of respondents did not engage in physical activity ( $n=83$ ; 75.5%). More than half ( $n=81$ ; 73.6%) did not have an annual influenza vaccination. Cigarette smoking was reported by 29.1% ( $n=32$ ) of the patients, while 87.3% ( $n=96$ ) indicated that they limited their alcohol consumption. The majority of respondents ( $n=46$ ; 41.8%) indicated that their exercise capacity in heart failure was classified as NYHA Class II, while a smaller proportion ( $n=39$ ; 35.5%) reported a Class III classification (Tab. 2).

**Table 2.** Health profile of respondents divided into adherent and non-adherent patients.

Variables	Categories/Statistics	Total ( $n = 110$ )		Adherent patients ( $n = 86$ )		Non-adherent patients ( $n = 24$ )	
		<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
No. of hospitalizations for heart failure Exacerbations in the past 2 years	M	1.02		0.91		1.42	
	SD	1.15		1.08		1.32	
	Me	1.00		1.00		1.00	
	Q1-Q3	0.00–2.00		0.00–1.00		0.00–2.75	
Body Mass Index (BMI)	M	29.41		29.55		28.92	
	SD	5.37		5.15		6.20	
	Me	28.32		28.73		26.78	
	Q1-Q3	25.30–32.98		24.00–31.50		24.29–35.17	

Variables	Categories/Statistics	Total (n = 110)		Adherent patients (n = 86)		Non-adherent patients (n = 24)	
		n	%	n	%	n	%
No. of medications taken daily	M	8.33		8.41		8.04	
	SD	3.12		3.16		3.03	
	Me	8.00		8.50		8.00	
	Q1-Q3	6.00-10.00		6.00-10.00		6.00-10.00	
Co-existence of additional chronic diseases concurrent with heart failure	Yes	105	95.5%	82	95.3%	23	95.8%
	No	5	4.5%	4	4.7%	1	4.2%
Diabetes		58	52.7%	47	54.7%	11	45.8%
Hypertension		91	82.7%	71	82.6%	20	83.3%
Atrial fibrillation		48	43.6%	36	41.9%	12	50.0%
Kidney failure		17	15.5%	13	15.1%	4	16.7%
Asthma		11	10.0%	10	11.6%	1	4.2%
Chronic obstructive pulmonary disease (COPD)		7	6.4%	6	7.0%	1	4.2%
Hypothyroidism		18	16.4%	15	17.4%	3	12.5%
Hyperthyroidism		3	2.7%	1	1.2%	2	8.3%
Rheumatic diseases		22	20.0%	18	20.9%	4	16.7%
Hypercholesterolaemia		52	47.3%	40	46.5%	12	50.0%
Other chronic diseases		27	24.5%	20	23.3%	17	70.8%
<b>Reasons for admission to the ED</b>							
Shortness of breath		71	64.5%	54	62.8%	17	70.8%
Deterioration of exercise tolerance		50	45.5%	42	48.8%	8	33.3%
Swelling of the extremities		27	24.5%	22	25.6%	5	20.8%
Chest pain		59	53.6%	44	51.2%	15	62.5%
A feeling of palpitations		17	15.5%	13	15.1%	4	16.7%
Syncope		17	15.5%	15	17.4%	2	8.3%
Other(s)		4	3.6%	4	4.7%	0	0.0%
Cardioverter defibrillator implantation	Yes	27	24.5%	21	24.4%	6	25.0%
	No	83	75.5%	65	75.6%	18	75.0%
Feeling of social isolation due to health condition	Yes	40	36.4%	27	31.4%	13	54.2%
	No	70	63.6%	59	68.6%	11	45.8%
Taking regular weight measurements	Yes	59	53.6%	54	62.8%	5	20.8%
	No	51	46.4%	32	37.2%	19	79.2%
Taking regular blood pressure measurements	Yes	97	88.2%	80	93.0%	17	70.8%
	No	13	11.8%	6	7.0%	7	29.2%
Adherence to dietary recommendations	Yes	40	36.4%	38	44.2%	2	8.3%
	No	70	63.6%	48	55.8%	22	91.7%
Engaging in regular physical activity	Yes	27	24.5%	26	30.2%	1	4.2%
	No	83	75.5%	60	69.8%	23	95.8%
Annual influenza vaccination	Yes	29	26.4%	26	30.2%	3	12.5%
	No	81	73.6%	60	69.8%	21	87.5%
Smoking cigarettes	Yes	32	29.1%	22	25.6%	10	41.7%
	No	78	70.9%	64	74.4%	14	58.3%
Restricting alcohol consumption	Yes	96	87.3%	77	89.5%	19	79.2%
	No	14	12.7%	9	10.5%	5	20.8%
<b>NYHA I</b>		14	12.7%	14	16.3%	0	0.0%
<b>NYHA II</b>		46	41.8%	37	43.0%	9	37.5%
<b>NYHA III</b>		39	35.5%	27	31.4%	12	50.0%
<b>NYHA IV</b>		11	10.0%	8	9.3%	3	12.5%

M – mean; SD – standard deviation; Me – median; Q1 – first quartile; Q3 – third quartile

**Treatment adherence and frailty syndrome in the study group – analysis of ACDS and TFI questionnaires.** More than half of the respondents ( $n=66$ ; 60.0%) obtained a score indicating a medium level of adherence to therapeutic recommendations. In contrast, almost 1 in 4 respondents ( $n=24$ ; 21.8%) obtained a low level of adherence (Tab. 3). Women did not differ significantly from men in terms of adherence levels, respectively; for men –  $M=22.72\pm 4.70$ , for women –  $M=22.46\pm 4.56$ ,  $t=-0.29$ ;  $p=0.771$ ).

**Table 3.** Adherence to treatment recommendations – ACDS questionnaire score

Levels of adherence to treatment recommendations	<i>n</i>	%
Low (0–20 points)	24	21.8%
Medium (21–46 points)	66	60.0%
High (27 points or more)	20	18.2%
Total	110	100.0%

The majority of respondents indicated the presence of frailty syndrome ( $n=76$ ; 69.1%). The prevalence of frailty syndrome was higher in women than in men (Tab. 4).

**Table 4.** Frequency analysis for TFI score categories by gender

Tilburg Frailty Indicator – interpretation			Women		Men	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Absence of frailty syndrome (0–4 points)	34	30.9%	11	23.9%	23	35.9%
Frailty syndrome (5 points or more)	76	69.1%	35	76.1%	41	64.1%
Total	110	100.0%	46	100%	64	100%

The level of adherence to treatment recommendations was inversely correlated with the total TFI score and the levels of frailty in the physical, psychological, and social domains. The relationship regarding the physical components of frailty was weak, while the others were moderately strong (Tab. 5).

**Table 5.** Results of correlation analysis between frailty syndrome and treatment adherence

Variables	ACDS	
Total TFI score	<i>r</i>	-0.38
	<i>p</i>	<0.001
TFI: physical domain	<i>r</i>	-0.25
	<i>p</i>	0.009
TFI: psychological domain	<i>r</i>	-0.40
	<i>p</i>	<0.001
TFI: social domain	<i>r</i>	-0.30
	<i>p</i>	0.001

*r* – Pearson's correlation coefficient; *p* – statistical significance

**Predictors of non-adherence to treatment recommendations in a group of patients with heart failure admitted to hospital emergency departments.** The regression model exhibited an appropriate fit to the data, explaining 23.3% of the variance in the dependent variable. Nevertheless, only 2 variables were identified as statistically significant predictors:

the psychological components of frailty and the number of hospitalizations for heart failure exacerbations in the past 2 years. The negative beta coefficient values for both predictors indicate that as the severity of psychological frailty and the number of hospitalizations increased, the ACDS score decreased, indicating a lower level of adherence to treatment recommendations. Among the 2 predictors, the psychological components of frailty were found to be the stronger predictor. The remaining variables were not found to have a statistically significant impact on the level of treatment adherence (Tab. 6).

## DISCUSSION

**Key results.** The study analyzed variables that could significantly impact the adherence to therapeutic recommendations among elderly patients with heart failure. The key results showed that 2 statistically significant predictors of non-adherence to therapeutic recommendations were psychological components of frailty, and the number of hospitalizations due to heart failure exacerbation in the last 2 years. As the psychological domain of frailty increased, adherence to therapeutic recommendations worsened. Similarly, as the number of hospitalizations increased, adherence among heart failure patients decreased.

It is worth noting that non-adherence can affect every aspect of the therapeutic process, including lifestyle elements such as dietary recommendations, use of stimulants, lack of regular physical activity, and not undergoing recommended annual vaccinations.

Another significant problem is the issue of taking medications inconsistently with medical recommendations. This includes not only the complete omission of prescribed medications, but also self-directed changes in dosing, discontinuation of certain medications, and the intake of additional medications and dietary supplements without prior consultation with a doctor. This broadly defined aspect of adherence thus poses a challenge for medical personnel aiming to verify the degree to which patients follow recommendations. The current study allowed not only for identifying certain variables that have a statistically significant impact on adherence, but also for identifying predictors of non-adherence [17].

**Interpretation.** The results of the current study showed that among elderly patients with heart failure, only 1 in 5 individuals ( $n=20$ ; 18.2%) demonstrated a high level of adherence to therapeutic recommendations. Moreover, the majority of heart failure patients ( $n=76$ ; 69.1%) also suffered from frailty syndrome in addition to their primary condition. In the study, this syndrome was more frequently observed in women – up to 76.1% ( $n=35$ ) of them exhibited symptoms of this syndrome, while among men, it was 64.1% ( $n=41$ ). A study by Dewan P. et al. demonstrated a similar relationship.

Among patients over 60 years of age, 69% showed symptoms of frailty. Additionally, the frailty syndrome was more common in women than in men (women – 68%, men – 62%) [18]. A meta-analysis of 29 studies conducted by Davis MR. et al. also confirmed that women are more prone to the frailty syndrome. It is estimated that this risk is 26% higher compared to the risk of frailty syndrome in men [19]. This result may be due to both biological and socio-cultural reasons, Women are characterized by less muscle mass than men, and

**Table 6.** Results of regression analysis using the input method, predicting adherence to treatment recommendations based on frailty and socio-demographic and health factors

Predictors	B	SE	Beta	t	p	F	df	p	R <sup>2</sup> <sub>adj.</sub>
(Constant)	18.99	6.15		3.09	<b>0.003</b>				
TFI: physical domain	-0.04	0.25	-0.02	-0.17	0.865				
TFI: psychological domain	-1.18	0.39	-0.34	-3.01	<b>0.003</b>				
TFI: social domain	-0.71	0.60	-0.15	-1.18	0.242				
Age	0.09	0.06	0.14	1.45	0.150				
No. of medications taken daily	0.21	0.14	0.15	1.54	0.126				
No. of hospitalizations for heart failure exacerbations in the past 2 years	-0.77	0.38	-0.19	-2.00	<b>0.048</b>	3.75	12; 97	<b>&lt;0.001</b>	0.233
Gender	0.85	0.93	0.09	0.91	0.364				
Marital status	-0.41	1.08	-0.04	-0.38	0.705				
Monthly net household income	0.16	0.89	0.02	0.18	0.861				
Education	1.87	1.34	0.13	1.39	0.167				
Cardioverter defibrillator implantation	-1.36	0.98	-0.13	-1.38	0.170				
Smoking cigarettes	-1.64	0.90	-0.16	-1.82	0.071				

Dependent variable: Treatment adherence; B – non-standardized regression coefficient; SE – standard error; Beta – standardized regression coefficient; t – Student's t-test result; F – analysis of variance result; R<sup>2</sup><sub>adj.</sub> – adjusted R-square

are therefore more quickly affected by physical limitations. Women are also more susceptible to osteoporosis, which increases the risk of falls and fractures, and consequently, disability. Lifestyle, susceptibility to addiction to stimulants, and resistance to stressors also have an impact on the increased risk of developing frailty syndrome. Women are more likely to lead a less physically active lifestyle, especially in old age. In addition, women are more susceptible to develop symptoms of depression, which is highly associated with the occurrence of frailty. The higher percentage of women with FS can be associated with the difference in life expectancy between the genders. The average life expectancy of women is longer, which also increases the risk of developing FS. Moreover, women use health care more often than men, which can also increase the number of diagnosed cases of the frailty syndrome. The importance of these differences in the occurrence of frailty syndrome between women and men has importance for clinical practice. Adapting interventions to the specific needs of gender can increase their effectiveness, improve the quality of life of patients, and can significantly reduce the risk of frailty syndrome. In the prevention of FS, gender differences in nutritional strategies should be taken into account to prevent loss of muscle mass and reduce the risk of osteoporosis.

The physical activity of both genders should also be approached individually. In addition, the implementation of screening tests for depression and taking action to activate older people could be a key element in reducing feelings of social isolation. To be effective against the development of frailty syndrome, activation interventions should be tailored to the gender and individual interests of patients with frailty syndrome [20, 21].

Moreover, own research results show a statistically significant relationship between the occurrence of frailty syndrome and the degree of adherence to therapeutic recommendations in heart failure patients. All 3 components of frailty measured by the TFI scale, mean that the physical, psychological, and social components negatively correlated with the level of adherence. This means that the higher the TFI scale score, the lower the adherence level measured by the ACDS questionnaire. Similar correlations were shown by studies conducted

by other authors. Research by Jankowska-Polańska B. et al. among 296 patients with hypertension showed that patients with an additional diagnosis of frailty had a lower adherence level compared to those without frailty [22]. This correlation was also confirmed in studies conducted by Bonikowska I. et al. among patients over 65 years old with type II diabetes. Among 175 patients, 80% were diagnosed with frailty syndrome, and patients with low adherence scores had significantly higher TFI scores for frailty [23].

The current study shows that, on average, patients were hospitalized at least once in the past 2 years due to heart failure exacerbation. Moreover, statistical analysis showed a significant negative correlation between the number of hospitalizations and adherence to therapeutic recommendations. This means that lower adherence was associated with more frequent hospitalizations due to disease exacerbation. Hood SR. et al. conducted studies among over 55,000 heart failure patients in Indiana, USA. It was shown that increasing medication adherence by 10% significantly reduced the negative effects of non-adherence. The number of emergency department visits decreased by 11%, hospital admissions by 6%, and total hospital stay length by 2%. Additionally, better adherence reduced the risk of death by 9% [24].

The current study focused on determining the predictors of non-adherence to therapeutic recommendations among heart failure patients. Components of frailty, as well as socio-demographic and health factors, were considered. Among the 12 variables analyzed, statistical significance was achieved for 2 predictors: psychological factors of frailty ( $p=0.003$ ) and the number of hospitalizations due to heart failure exacerbation in the last 2 years ( $p=0.048$ ). Both variables showed a negative correlation with adherence to therapeutic recommendations. A systematic literature review conducted by Poletti V. et al. focused on examining the relationship between depression and adherence to therapeutic recommendations in heart failure patients. Most publications included in the review indicated that medication adherence was higher in patients without symptoms of depression. Moreover, the presence of depression in heart failure patients with low medication adherence increased the hospitalization rate by 45%. Some authors also considered the relationship between depression

and anxiety and adherence to health-related behaviours, such as physical activity, proper diet, weight control, and recommended vaccinations. It was shown that heart failure patients without depression were 2.5 times more likely to adhere to proper health behaviours [25]. Studies by Jankowska-Polańska B. et al. demonstrated that cognitive functions are an independent predictor related to regular weight control, fluid restriction, and regular physical activity. Furthermore, the number of hospitalizations due to heart failure exacerbation was shown to be a significant predictor of non-adherence to therapeutic recommendations in heart failure patients [26].

**Generalisability.** Maintaining a sufficiently high level of adherence to therapeutic recommendations among chronically ill patients is a challenge in modern medicine. This applies not only to heart failure patients but also to patients with other co-occurring conditions. This indicates the need for broad health education at every stage of the disease and regular monitoring of adherence. A key aspect is familiarizing patients with recommendations regarding diet, physical activity, the use of stimulants, and self-monitoring of disease symptoms. Moreover, it is also important to focus on educating patients at risk of cardiovascular diseases. Introducing primary prevention at the appropriate stage to reduce disease risk, as well as secondary prevention involving early detection and prompt treatment, can positively impact both lifespan and the quality of life.

**Limitations of the study.** The main limitation of the study was that it was carried out in only one emergency department. Additionally, the study was limited by the small number of patients examined, which was due to a significant number of hospitalized patients having incomplete verbal logical contact. This was caused by factors such as the patient's severe condition, cognitive disorders, and advanced age. Moreover, some patients refused to participate in the study.

One of the important limitations was the inability to establish a cause-and-effect relationships. Other limitations included random selection for the research sample not being used, only purposive selection, and some limitations being the result of the cross-sectional design of the study, neither does the study provide information on the temporal sequence of events, making it difficult to infer the direction of associations. Additionally, cross-sectional studies may not adequately account for confounding variables, which could result in improper associations being discovered. The above limitations must be carefully considered when interpreting the results.

## CONCLUSIONS

In the study of elderly patients with heart failure admitted to the emergency department, approximately 70% were found to have the frailty syndrome. The presence of this syndrome was found to have a statistically significant impact on the patients' ability to comply with treatment recommendations.

A minority of heart failure (HF) patients admitted to the emergency department (ED) demonstrated high levels of adherence to prescribed treatment recommendations, with the majority demonstrating low or average levels of adherence.

A number of factors were identified as predictors of non-adherence to treatment among patients with heart failure.

These include the psychological components of frailty, as measured by the TFI scale, and the number of hospitalizations for heart failure exacerbations in the past 2 years.

As the frailty syndrome in the psychological domain worsens, the patients' adherence to treatment significantly deteriorates. Therefore, psychological support should be provided to the patient to maintain motivation and commitment to the treatment process. In order to address this issue, a patient exhibiting indications of diminished mood should be referred to a psychologist or therapist for treatment. Furthermore, involvement of the patient's family can significantly enhance the likelihood of more effective adherence to treatment recommendations, and positively impact the improvement of health outcomes and quality of life for patients.

The attitude of the family in engaging in therapeutic compliance plays a very important role and includes many aspects related to the treatment process.

- (a) Support from the family is largely determined by the patient's degree of independence. The role of the family of a patient who demonstrates a high degree of independence comes down to emotional support, maintaining the patient's positive attitude, and motivating the patient to educate himself/herself about the disease.
- (b) In the case of patients who are less able to cope with the difficulties of daily life, the family should show greater involvement in the patient's treatment process. Their role should be controlling the regular intake of medications, monitoring the patient's condition and taking appropriate action if there are alarming symptoms suggesting an exacerbation of the disease.
- (c) The family should also supervise regular visits to doctors and the performance of check-ups. In addition, the family should assist the patient in performing activities of daily living and create appropriate conditions for rehabilitation of the patient aimed at maintaining and increasing the patient's degree of independence.
- (d) If family members observe symptoms of depressed mood in the patient, they should motivate the patient to seek psychological help, as well as offer participation in support groups that bring together patients suffering from the same disease.

Psychological support for patients and their families should be introduced at the beginning of the disease, i.e. at the time of diagnosis. It plays a key role in the patient's acceptance of the new situation, which very often causes great stress that negatively affects the patient's condition. Support from a psychologist motivates patients to maintain healthy habits, such as adherence to medical recommendations and regular physical activity. It also plays a major role in rebuilding relationships and communication, preventing patients from becoming isolated. It should be stressed that the type of psychological support should be appropriately selected according to the patient's condition. For some patients, participation in support group activities will be enough, while others will need family or individual therapy. Through psychoeducation, the patient can more easily understand his illness, learn to cope with his emotions and learn self-help strategies.

In order to improve the quality of life of chronically ill patients and reduce re-hospitalizations, the general practitioner (GP) should also play a key role, through regular visits, knowledge of the patient's medical history, they can build trust with the patients and their families. This will enable the



GP to effectively manage the disease. In terms of prevention, the GP should educate patients about healthy lifestyles, as well as detect and modify factors that may contribute to the development of the disease. In the case of patients who already have a chronic disease, the GP should motivate them to have regular check-ups, and quickly modify treatment when the patient's condition worsens to avoid hospitalization.

General practitioner should also provide health education to patients and their families, and encourage patients to regularly self-monitor such factors as body weight, blood pressure and heart rate. Patients and their families should be educated on recognizing the symptoms of disease exacerbation, which can include: the occurrence of dyspnea at rest, worsening of exercise tolerance, the appearance of oedema in the extremities, and sudden weight gain.

It is also important to consider that patients who are hospitalized with greater frequency tend to demonstrate a decline in their level of adherence. The involvement of both the family and the family doctor appears to be of paramount importance in this regard. The objective is to prevent the decompensation of heart failure in these patients, and to prevent further hospitalizations.

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