

Strukturirani program edukacije bolesnika sa zatajivanjem srca: „Ne učimo za školu, nego za život“

Structured patient education programme in heart failure: “We do not learn for school, but for life”

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SAŽETAK: Uvod: U skrbi za bolesnike sa zatajivanjem srca (HF, prema engl. *heart failure*) jedan od važnih uzroka kliničke inercije na koji možemo utjecati jest nedostatak znanja o HF-u u samih bolesnika. Sukladno tomu, edukacija bolesnika jedna je od strateških sastavnica Smjernica za zatajivanje srca Europskoga kardiološkog društva iz 2021. godine.

Cilj: Procijeniti kratkoročan i dugoročan učinak strukturiranog programa edukacije bolesnika s HF-om (PEP; prema engl. *patient education programme*), koji provodi naša Radna skupina za HF, na znanje bolesnika o HF-u i samoskrb.

Metode: Procijenili smo učinkovitost strukturiranog PEP-a u uzastopnoj skupini bolesnika hospitaliziranih zbog HF-a između 1. lipnja 2023. i 1. srpnja 2024. u Jedinici za HF tercijarnoga kardiološkog centra, koristeći se prethodno razvijenim upitnikom Radne skupine za HF, koji se sastojao od 11 pitanja s jednim točnim odgovorom, a koji je bio primijenjen prije i nakon provedbe PEP-a kao dio rutinske skrbi. Dugoročno održavanje stečenoga znanja i učinkovitost samoskrbi procijenjeni su tri mjeseca nakon PEP-a ponovnom primjenom upitnika s 11 pitanja te evaluacijom s pomoću međunarodno validirane Europske ljestvice ponašanja vezanog uz samoskrb kod HF-a (EHFScB-9, prema engl. *European HF Self-care Behaviour Scale*). Prediktori optimalne samoskrbi, definirane na naveden način, analizirani su logističkom regresijskom analizom.

Rezultati: Analizirani su podatci prva 164 uzastopna bolesnika (78 % muškaraca, s medijanom životne dobi 56 [47–64] godina, a 44 % njih već je bilo prethodno hospitalizirano zbog HF-a). Prema ukupnim rezultatima upitnika, edukacija je znatno poboljšala znanje bolesnika (9 [8–10] prema 11 [11–11], $p < 0,001$; prije PEP-a u usporedbi sa stanjem nakon PEP-a). Tromjesečno praćenje pokazalo je trajno održavanje poboljšanja znanja (9 [8–10] u usporedbi sm 11 [11–11] bodova, $p < 0,001$; prije PEP-a prema tri mjeseca nakon PEP-a). Prema ljestvici EHFScB-9, 86 % bolesnika primjenjivalo je optimalnu samoskrb nakon tri mjeseca, neovisno o njihovim obilježjima.

Zaključak: Ovi rezultati upućuju na to da strukturirani PEP za bolesnike s HF-om znatno poboljšava i trajno održava znanje bolesnika te potiče optimalnu samoskrb, čime se dodatno potvrđuje strateška važnost takvih edukacijskih programa.

SUMMARY: Introduction: In heart failure (HF) care, one important modifiable cause of clinical inertia is the lack of patients' knowledge about HF. Consequently, patient education is a strategic component of the European Society of Cardiology 2021 HF Guidelines.

Objective: To assess the short- and long-term impact of a structured HF patient education programme (PEP) conducted by our Working Group on HF on patients' knowledge of HF and self-care.

Methods: We assessed the effectiveness of a structured PEP in a consecutive group of patients hospitalized for HF between June 1st 2023 to July 1st 2024 at the HF Unit of our tertiary cardiology centre using an 11-item single-choice questionnaire developed earlier by our Working Group on HF, administered before and after the PEP as part of the routine care. The long-term maintenance of the acquired knowledge and the effectiveness of patients' self-care were assessed 3 months after the PEP by re-administration of the 11-item questionnaire and evaluation using the internationally validated “European HF Self-care Behaviour Scale” (EHFScB-9). The predictors of optimal self-care, as defined in this way, were analysed using logistic regression analysis.

Results: We analysed the data of the first 164 consecutive participants (78% male, median age 56 [47–64] years, previous hospitalisation for HF: 44%). The education significantly improved patients' knowledge based on the total questionnaire scores (9 [8–10] vs. 11 [11–11], $p < 0.001$; before vs. after PEP). The 3-month follow-up showed sustained knowledge improvement (9 [8–10] vs. 11 [11–11] points, $p < 0.001$; before vs. 3 months after PEP). Based on the EHFScB-9, 86% of patients demonstrated optimal self-care at 3 months, unaffected by patient characteristics.

Conclusion: Our results suggest that a structured HF PEP significantly improves and permanently maintains patient knowledge and promotes optimal self-care; which strengthens the strategic importance of PEP.

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KLJUČNE RIJEČI: strukturirani program edukacije bolesnika, samoskrb, zatajivanje srca.

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Uvod

Zatajivanje srca (HF) i dalje je jedna od najvažnijih kardiovaskularnih bolesti te označuje znatan javnozdravstveni izazov na globalnoj razini, a tijekom života može se razviti u i do jedne od pet osoba¹. Zatajivanje srca može se smatrati bolešću s lošom prognozom usporedivom s prognozom najčešćih malignih bolesti, pri čemu je, bez odgovarajućeg liječenja, prognoza jednako nepovoljna².

Prema Smjernicama za zatajivanje srca Europskoga kardio-loškog društva (ESC) iz 2021. godine, svi bolesnici s HF-om trebaju biti uključeni u multidisciplinarni program zbrinjavanja (preporuka razreda I., razina dokaza A)³. Unutar takvog modela skrbi strateški je važno ne samo liječenje samoga HF-a nego i rano prepoznavanje te učinkovito liječenje komorbiditeta, pri čemu ključnu ulogu imaju uključivanje i suradnja drugih specijalističkih struka⁴. Smjernice također naglašavaju da svi bolesnici s HF-om trebaju biti educirani o samoskrbi radi smanjenja mortaliteta i prevencije hospitalizacija. Prema dostupnim podatcima iz literature, odgovarajuća samoskrb može smanjiti rizik od hospitalizacije povezane s HF-om za čak 20 %, uz istodobno znatno poboljšanje kvalitete života⁵.

Na temelju Smjernica ESC-a za HF iz 2021. godine i praktičnih preporuka Udruženja za HF ESC-a iz iste godine, nema dvojbe da edukacija bolesnika mora postati sastavni dio sveobuhvatne skrbi^{3,6}. Međutim, neka praktična pitanja vezana uz njezinu primjenu u suvremenoj kliničkoj praksi i dalje ostaju neriješena, uključujući edukacijsku metodologiju i strukturu sadržaja koji se bolesnicima prenosi.

Ciljevi

Cilj je ovog istraživanja bio analizirati učinkovitost strukturiranoga programa edukacije bolesnika koji provodi Radna skupina za HF među bolesnicima hospitaliziranim zbog HF-a u Jedinici za HF Odjela za kardiologiju odraslih Nacionalnoga kardiovaskularnog centra Gottsegen, a koji prethodno nisu bili uključeni u strukturirani edukacijski program. Svrha je bila procijeniti utjecaj edukacijskoga programa na znanje povezano s HF-om, prepoznavanje hitnih stanja, svijest o samoskrbi te dugoročno održavanje stečenoga znanja, koristeći se Europskom ljestvicom ponašanja vezanog uz samoskrb kod HF-a (EHFScB-9, prema *European Heart Failure Self-care Behaviour Scale*).

Introduction

Heart failure remains one of the most important cardiovascular diseases, posing a major public health challenge worldwide, and may develop in up to one in five individuals during their lifetime¹. Heart failure (HF) may be regarded as a disease with a malignant prognosis comparable to that of the most common cancers, and if left untreated, its prognosis is similarly poor².

According to the 2021 European Society of Cardiology (ESC) Heart Failure Guidelines, all patients with HF should be enrolled in a multidisciplinary HF management programme (Class I recommendation, Level of evidence: A)³. Within this model of care, not only is the management of HF itself of strategic importance, but also the early recognition and effective treatment of comorbidities, in which the involvement of and collaboration with allied specialties also play a key role⁴. The Guidelines further emphasize that all patients with HF should be educated in self-care to improve mortality and prevent hospitalization for HF. According to the literature, adequate self-care may reduce the risk of HF-related hospitalization by as much as 20%, while significantly improving quality of life as well⁵.

Based on the 2021 ESC Heart Failure Guidelines and the 2021 practical management recommendations of the ESC Heart Failure Association, there is no doubt that patient education must become an integral component of comprehensive care^{3,6}. However, several practical issues regarding its implementation remain unresolved in contemporary practice, including the educational methodology and structure of the material to be delivered.

Objectives

Our study aimed to analyze the effectiveness of the structured patient education programme implemented by our Working Group on Heart Failure among patients hospitalized for HF at the Heart Failure Unit of the Department of Adult Cardiology of Gottsegen National Cardiovascular Center who had not previously received structured patient education. Specifically, we aimed to assess its impact on HF-related knowledge, recognition of emergency conditions, self-care awareness, and the long-term persistence of this knowledge using the European Heart Failure Self-care Behavior scale (EHFScB-9).

Metode

STRUKTURIRANI PROGRAM EDUKACIJE BOLESNIKA

U ovom retrospektivnom opservacijskom istraživanju analizirani su podatci prva 164 uzastopna bolesnika hospitalizirana zbog HF-a te uključena u strukturirani program edukacije bolesnika u Jedinici za zatajenje srca Odjela za kardiologiju odraslih Nacionalnog kardiovaskularnog centra Gottsegen, u razdoblju od 1. lipnja 2023. do 1. srpnja 2024. Istraživanje je odobrilo Nacionalno znanstveno i etičko povjerenstvo Mađarske (broj odobrenja: BM/27849-3/2024). Provedeno je u skladu s etičkim načelima Helsinške deklaracije.

Tijekom strukturiranog programa edukacije bolesnici su zajedno sa članovima svojih obitelji sudjelovali u interaktivnom predavanju u trajanju od približno 60 minuta, koje su zajednički vodili specijalisti za HF s certifikatom ESC-a i medicinska sestra specijalizirana za skrb o bolesnicima s HF-om. Nakon predavanja slijedila je rasprava tijekom koje su se obrađivala pitanja i problemi povezani s prezentiranim sadržajem. Obradene teme uključivale su osnovne pojmove vezane uz HF relevantne za svakodnevni život; važnost dolaska na redovite kontrolne preglede i planirane dijagnostičke postupke; usvajanje načela samoskrbi; različite terapijske mogućnosti od strateške važnosti i s njima povezana pitanja; te preventivne mjere. Tijekom predavanja i naknadne rasprave poseban je naglasak stavljen na kliničke situacije povezane sa HF-om koje se mogu pojaviti u svakodnevnom životu te koje treba smatrati hitnim stanjima koja zahtijevaju žurno savjetovanje s liječnikom ili čak hitnu medicinsku intervenciju.

Znanje bolesnika o HF-u i učinkovitost strukturiranog programa edukacije rutinski se procjenjuju primjenom upitnika. U tu svrhu koristimo se upitnikom koji je razvila Radna skupina za HF, koji se sastoji od 11 pitanja s jednim točnim odgovorom, a bolesnici ga ispunjavaju prije i nakon edukacijskog programa. Dugoročno održavanje stečenoga znanja rutinski se procjenjuje tijekom kontrolnih pregleda tri mjeseca nakon edukacije ponovnim ispunjavanjem upitnika⁷, zajedno s primjenom međunarodno validiranog EHFSB-9 upitnika⁸.

STATISTIČKA ANALIZA

Klinički podatci prikupljeni su iz institucionalnog informacijskog sustava te zabilježeni u anonimiziranom obliku u programu *Microsoft Excel* (Microsoft Corporation, Redmond, WA, SAD). Statističke analize provedene su uporabom programa *IBM SPSS Statistics* verzije 26.0 (International Business Machines Corporation, Armonk, NY, SAD). Kontinuirane varijable prikazane su kao srednja vrijednost i interkvartilni raspon zbog njihove nenormalne distribucije, dok su kategorijske varijable prikazane u postotcima. Za usporedbu ukupnih rezultata upitnika s 11 pitanja prije i nakon edukacije, kao i prije edukacijskog programa te nakon tromjesečnoga praćenja, primijenjen je Wilcoxonov test predznaka rangova. Statistička značajnost definirana je vrijednošću $p < 0,05$.

Ukupno bodovanje prema EHFSB-9 pretvoreno je u ljestvicu od 0 do 100 prema sljedećoj formuli: $[(45 - \text{ukupni rezultat bodovanja prema EHFSB-9}] \times 2,777$, pri čemu rezultat ≥ 70 prema literaturi označuje odgovarajuću samoskrb⁹⁻¹¹. Wagenaar i sur. definirali su ovu graničnu vrijednost na temelju sličnog konstrukta, standardiziranog 100-bodovnog Indek-

Methods

THE STRUCTURED PATIENT EDUCATION PROGRAMME

In this retrospective observational study, we analyzed data from the first 164 consecutive patients hospitalized for HF and participating in a structured patient education programme at the Heart Failure Unit of the Department of Adult Cardiology of our tertiary cardiology centre, Gottsegen National Cardiovascular Center between 1 June 2023 and 1 July 2024. The study was approved by the National Scientific and Ethical Committee of Hungary (approval number: BM/27849-3/2024) and was conducted in accordance with the ethical principles of the Declaration of Helsinki.

During the structured patient education programme, patients, together with their relatives, participate in an approximately 60-minute interactive lecture jointly led by ESC-certified HF specialists and a specialist nurse dedicated to HF care. This is followed by a discussion that addresses questions and problems that may arise regarding this material. Topics covered include the main HF-related concepts relevant to everyday life; the importance of attending follow-up visits and scheduled investigations; the acquisition of self-care principles; various treatment options of strategic importance and related questions; and preventive issues. During both the lecture and the subsequent discussion, particular emphasis is placed on HF-related clinical situations that may occur in daily life and should be regarded as emergencies requiring prompt medical consultation or even immediate medical attention.

Patients' knowledge of HF and the effectiveness of the structured patient education programme are routinely assessed using a questionnaire-based approach. For this purpose, we use an 11-item single-choice questionnaire developed by our Working Group on Heart Failure, before and after the educational session. The long-term persistence of this knowledge is routinely assessed at follow-up visits, 3 months after the education by repeated completion of the questionnaire⁷, together with the administration of the internationally validated 9-item EHFSB-9⁸.

STATISTICAL ANALYSIS

Clinical data were extracted from our institutional information system and recorded in anonymized form in a Microsoft Excel spreadsheet (Microsoft Corporation, Redmond, WA, USA). Statistical analyses were performed using IBM SPSS Statistics version 26.0 (International Business Machines Corporation, Armonk, NY, USA). Continuous variables are presented as median and interquartile range, given their non-normal distribution, whereas categorical variables are reported as percentages. The Wilcoxon signed-rank test was used to compare total scores of the 11-item single-choice questionnaire obtained before and after the education, as well as before the education programme and at 3-month follow-up. Statistical significance was defined as $p < 0.05$.

The total EHFSB-9 score was transformed to a 0–100 scale using the following formula: $[(45 - \text{total EHFSB-9 score}] \times 2.777$, with a score ≥ 70 indicating adequate self-care according to the literature⁹⁻¹¹. Wagenaar *et al.* defined this cut-off based on a similar construct, the 100-point standardized Self-Care of Heart Failure Index, in which adequate self-care was defined

sa samoskrbi kod HF-a, u kojem je odgovarajuća samoskrb definirana rezultatom od 70 ili više^{9,12}. Prediktori optimalne samoskrbi definirani prema EHFSb-9 analizirani su logističkom regresijskom analizom. U univarijantnoj logističkoj regresijskoj analizi kombinacija vrijednosti $p < 0,05$ i omjera izgleda (engl. *odds ratio*, OR) $\neq 1$ smatrana je statistički značajnom.

Rezultati

GLAVNA KLINIČKA OBILJEŽJA ISPITIVANE POPULACIJE

U ispitivanoj populaciji zabilježena je izražena predominacija muškaraca (muški spol: 78 %), a medijan životne dobi iznosio je 56 [47–64] godina (**Tablica 1**). Kohortu je karakterizirala

as a score of 70 or higher^{9,12}. Predictors of optimal self-care, as defined by the EHFSb-9, were analyzed using logistic regression. In univariable logistic regression analysis, the combination of $p < 0.05$ and an odds ratio (OR) $\neq 1$ was considered statistically significant.

Results

MAIN CLINICAL CHARACTERISTICS OF THE STUDY POPULATION

A marked male predominance was observed in the study population (male sex: 78%), and the median age was 56 [47–64] years (**Table 1**). The cohort was characterized by multimorbidity, with 61% of patients having ≥ 2 comorbidities. At hospital discharge, the median N-terminal pro-B-type natriuretic

TABLE 1. Main characteristics of the study group.

Parameters	Total cohort (n=164)
Male sex	78%
Age, median [IQR], years	56 [47-64]
„De novo” diagnosis of heart failure	37%
Previous hospitalization for heart failure	44%
Left ventricular ejection fraction, median [IQR], %	27 [20-35]
HFrEF	84%
HFmrEF	6%
HFpEF	9%
HFimpEF	1%
Coronary artery disease	28%
Diabetes	28%
Hypertension	60%
Atrial fibrillation/flutter	34%
Prehospitally diagnosed chronic kidney disease	11%
Anemia *	20%
≥ 2 comorbidities	61%
Clinical and laboratory parameters at hospital discharge	
Heart rate, median [IQR], min-1	83 [70-100]
Systolic blood pressure, median [IQR], mm Hg	119 [104-135]
eGFR, median [IQR], mL/min/1.73m ²	64 [52-80]
eGFR < 60 mL/min/1.73m ²	38%
Serum potassium, median [IQR], mmol/L	4.0 [4.0-4.9]
Serum sodium, median [IQR], mmol/L	137 [136-139]
Hemoglobin, median [IQR], g/L	145 [132-157]
NT-proBNP, median [IQR], pg/mL	1578 [600-2983]
Pharmacotherapy and device therapy at hospital discharge	
RASi (ACEi/ARB/ARNI)	97%
β B	92%
MRA	91%
SGLT2i	85%
Triple therapy (RASi+ β B+MRA)	84%
Quadruple therapy (RASi+ β B+MRA+SGLT2i)	76%
ICD (without CRT)	19%
CRT-P/CRT-D	9%

ACEi: angiotensin-converting enzyme inhibitor; ARB: angiotensin receptor blocker; ARNI: angiotensin receptor neprilysin inhibitor; β B: beta-blocker; CRT-D/CRT-P: cardiac resynchronization therapy with or without defibrillator; eGFR: estimated glomerular filtration rate; HFimpEF: heart failure with improved ejection fraction; HFmrEF: heart failure with mildly reduced ejection fraction; HFpEF: heart failure with preserved ejection fraction; HFrEF: heart failure with reduced ejection fraction; ICD: implantable cardioverter defibrillator; IQR: interquartile range; MRA: mineralocorticoid receptor antagonist; NT-proBNP: N-terminal pro-B type natriuretic peptide; RASi: renin-angiotensin system inhibitor; SGLT2i: sodium-glucose co-transporter 2 inhibitor; *: hemoglobin < 130 g/L for male sex, hemoglobin < 120 g/L for female sex

multimorbidnost, pri čemu je 61 % bolesnika imalo ≥ 2 komorbiditeta. Pri otpustu iz bolnice srednja vrijednost N-terminalnog pro-B-tip natriuretskog peptida (NT-proBNP) iznosila je 1578 (600 – 2983) pg/mL. Srednja vrijednost ejekcijske frakcije lijeve klijetke (LVEF) bila je 27 % [20 – 35 %], a 84 % kohorte pripadalo je skupini HFrEF-a. Ukupno je 44 % bolesnika bilo prethodno hospitalizirano zbog HF-a, dok je u 37 % bolesnika dijagnoza HF-a postavljena *de novo*.

Pri otpustu je znatan udio kohorte primao terapiju neurohormonalnim antagonistima: 97 % bolesnika primao je inhibitor reninsko-angiotenzinskog sustava (RASi: inhibitor angiotenzin-konvertirajućeg enzima [ACEi]/blokator angiotenzinskih receptora [ARB]/inhibitor angiotenzinskog receptora i neprilizina [ARNI]), 92 % bolesnika primao je beta-blokator (β B), a 91 % antagonist mineralokortikoidnih receptora (MRA); sukladno tomu, 84 % bolesnika primao je trojnu terapiju (RASi [ACEi/ARB/ARNI] + β B + MRA). Terapija inhibitorima natrij-glukoznog kotransportera 2 (SGLT2i) dapagliflozinom ili empagliflozinom bila je propisana u 85 % bolesnika, dok je četverostruka terapija (RASi [ACEi/ARB/ARNI] + β B + MRA + SGLT2i) bila uvedena u 76 % bolesnika do trenutka otpusta. Srčana resinkronizacijska terapija (s elektrostimulatorom/defibrilatorom [CRT-P/CRT-D]) bila je prisutna u 9 % kohorte, dok je 19 % bolesnika pri otpustu imalo implantabilni kardioverterski defibrilator (ICD; bez CRT-D-a).

REZULTATI

Nakon provedbe programa edukacije bolesnika zabilježeno je znatno poboljšanje rezultata na upitniku s 11 pitanja koji je razvila Radna skupina za HF (9 [8 – 10] prema 11 [11 – 11] bodova, $p < 0,001$; prije edukacije i nakon edukacije), a poboljšanje se održalo i tijekom tromjesečnoga praćenja, što upućuje na trajno zadržavanje stečenoga znanja (9 [8 – 10] prema 11 [11–11] bodova, $p < 0,001$; prije edukacije i tri mjeseca nakon edukacije) (slika 1).

peptide (NT-proBNP) level was 1578 [600–2983] pg/mL. Median left ventricular ejection fraction (LVEF) was 27 [20–35] %, and 84% of the cohort belonged to the HFrEF category. A total of 44% of patients had previously been hospitalized for HF, while 37% were diagnosed with *de novo* HF.

At discharge, a substantial proportion of the cohort received neurohormonal antagonist therapy: 97% received a renin-angiotensin system inhibitor (RASi: angiotensin-converting enzyme inhibitor [ACEi]/angiotensin receptor blocker [ARB]/angiotensin receptor-neprilysin inhibitor [ARNI]), 92% a beta-blocker (β B), and 91% a mineralocorticoid receptor antagonist (MRA); accordingly, 84% were receiving triple therapy (RASi [ACEi/ARB/ARNI] + β B + MRA). Sodium-glucose cotransporter-2 inhibitor (SGLT2i) therapy with dapagliflozin or empagliflozin was prescribed in 85% of patients, and quadruple therapy (RASi [ACEi/ARB/ARNI] + β B + MRA + SGLT2i) had been initiated in 76% by the time of discharge. Cardiac resynchronization therapy (with pacemaker/defibrillator [CRT-P/CRT-D]) was present in 9% of the cohort, while 19% had an implantable cardioverter-defibrillator (ICD; without CRT-D) at hospital discharge.

RESULTS

Following the patient education programme, a marked improvement was observed in the scores on the 11-item questionnaire developed by our Working Group on Heart Failure (9 [8–10] vs. 11 [11–11] points, $p < 0.001$; before vs. after education), and this persisted at 3-month follow-up, indicating the durable retention of the educational content (9 [8–10] vs. 11 [11–11] points, $p < 0.001$; before education vs. 3 months after education) (Figure 1).

At 3 months of follow-up, the median total EHFSB-9 score was 13 [11–16], which corresponded to a median score of 89 [81–94] after transformation to the 0–100 scale. A total of 86%

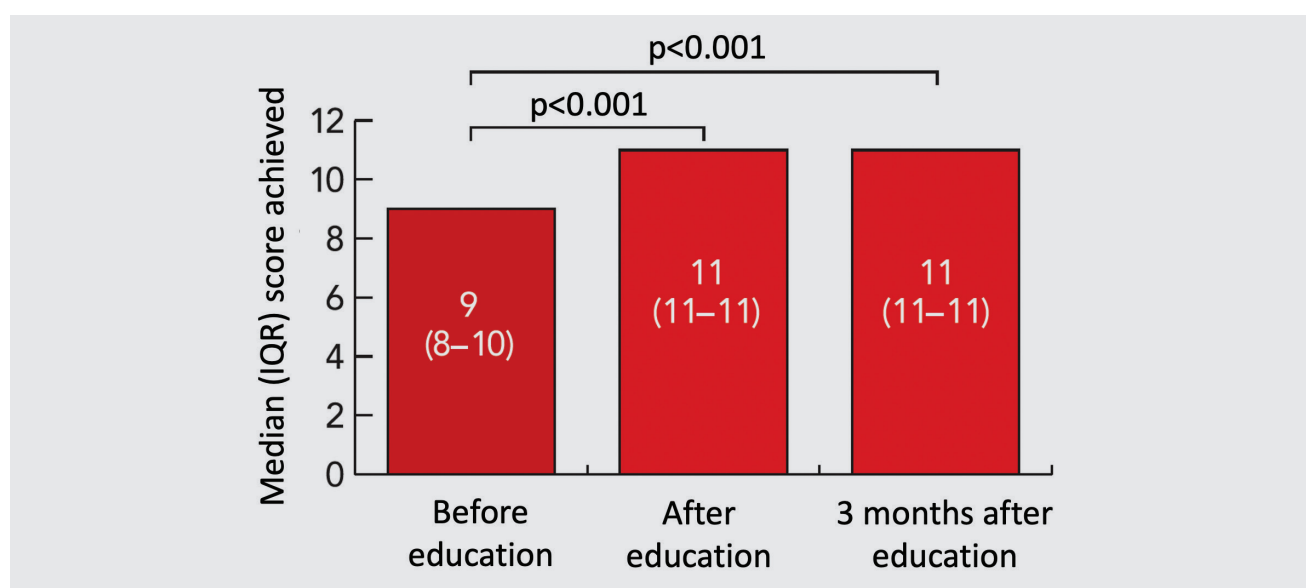


FIGURE 1. Change in total scores of the 11-item single-choice questionnaire developed by our Working Group on Heart Failure following the structured patient education programme. IQR: interquartile range

Nakon tri mjeseca praćenja srednja vrijednost ukupnog rezultata EHFS_{CB}-9 iznosila je 13 [11 – 16], što je nakon pretvaranja u ljestvicu od 0 do 100 odgovaralo srednjoj vrijednosti od 89 [81 – 94]. Ukupno je 86 % kohorte postiglo ≥ 70 bodova prema EHFS_{CB}-9 (**slika 2**), čime je potvrđena optimalna samoskrb.

Prema rezultatima univarijatne logističke regresijske analize, na optimalnu samoskrb definiranu prema EHFS_{CB}-9 nisu utjecala obilježja bolesnika, uključujući dob, spol, stupanj obrazovanja, uključenost obitelji i sudjelovanje u programu edukacije bolesnika, pobol, *de novo* dijagnoza HF-a i LVEF (**slika 3**).

of the cohort achieved an EHFS_{CB}-9 score ≥ 70 (**Figure 2**), thus confirming optimal self-care.

According to univariable logistic regression analysis, optimal self-care as defined by the EHFS_{CB}-9 was not influenced by patient characteristics, including age, sex, educational level, family involvement and participation in the patient education programme, comorbidities, *de novo* diagnosis of HF, and LVEF (**Figure 3**).

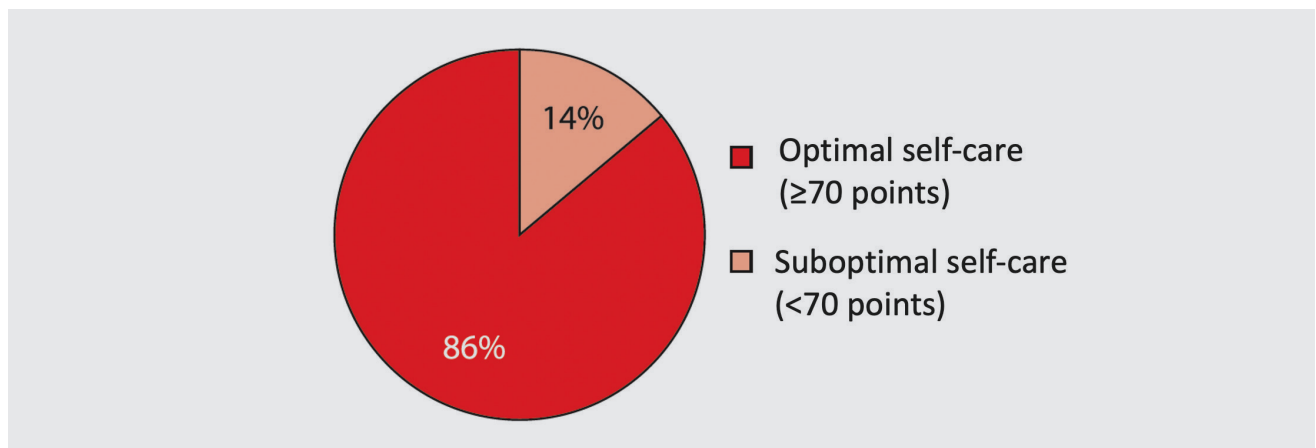


FIGURE 2. Optimal self-care defined on the basis of the EHFS_{CB}-9 at 3 months after the structured patient education programme.

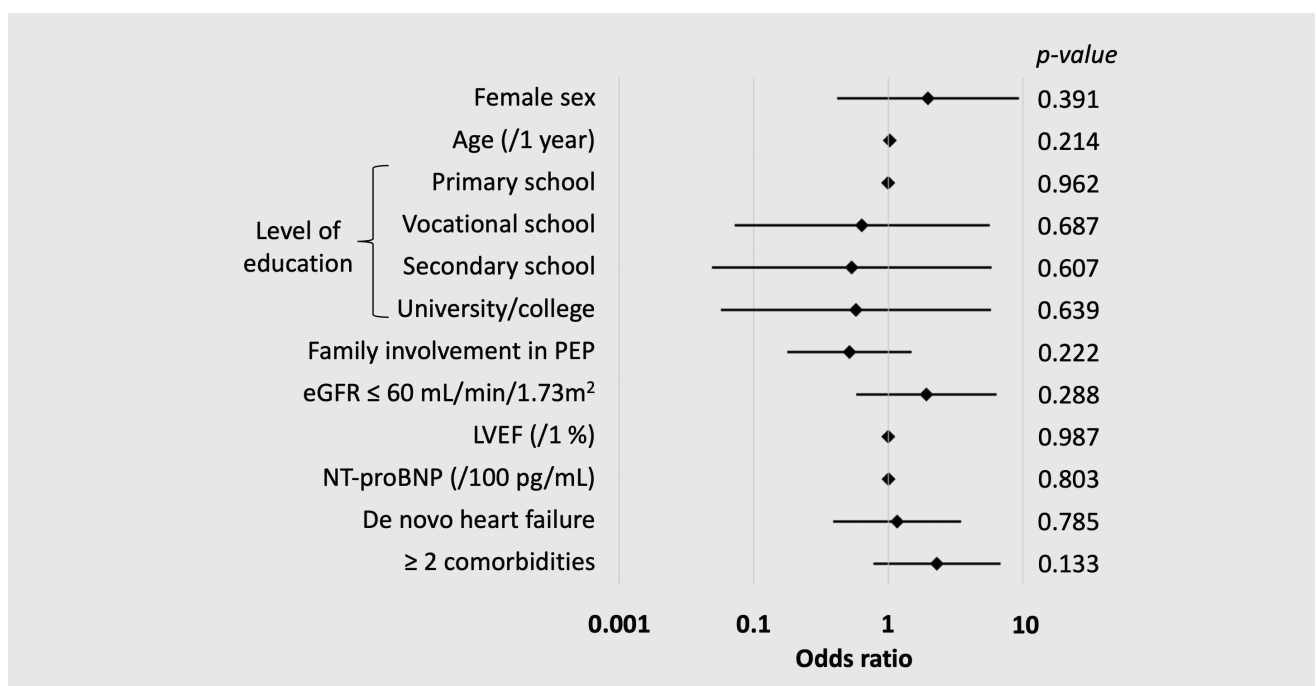


FIGURE 3. Predictors of optimal self-care.

PEP: patient education programme; eGFR: estimated glomerular filtration rate; LVEF: left ventricular ejection fraction; NT-proBNP: N-terminal pro-B-type natriuretic peptide

Rasprava

RASPRAVA

Optimizacija i dugoročno održavanje terapije u bolesnika s HF-om i dalje su velik izazov u svakodnevnoj kliničkoj praksi^{13,14}. U tom postupku postoji više točaka na kojima se intervencijama može unaprijediti kvaliteta skrbi i osigurati dugotrajno pridržavanje terapije, a među njima je jedna od najvažnijih, najjednostavnijih, ali i strateški najrelevantnijih sastavnica upravo odgovarajuća edukacija bolesnika¹⁵.

Metaanaliza objavljena 2024. godine, koja je uključivala podatke o 5446 bolesnika, pokazala je da programi edukacije bolesnika koji uključuju sudjelovanje medicinskih sestara specijaliziranih za HF također poboljšavaju prognozu te mogu smanjiti rehospitalizacije zbog HF-a za čak 25 %¹⁶. Analiza Radne skupine za HF Središnje vojne bolnice sjeverne Pešte također je potvrdila da je multidisciplinarna skrb pružena u Ambulanti za HF, uz uključivanje specijalizirane medicinske sestre, imala izražen prognostički učinak; u analizi uparenoj prema srodnosti kombinirani ishod jednogodišnje ukupne smrtnosti i ukupne hospitalizacije zbog svih uzroka smanjen je za čak 37,5 %¹⁷. Ti rezultati dodatno potvrđuju stratešku važnost sveobuhvatne edukacije bolesnika i multidisciplinarnu skrb koja se provodi u specijaliziranim ambulantama za HF uz sudjelovanje specijaliziranih medicinskih sestara.

Prema svakodnevnom kliničkom iskustvu, znanje bolesnika o HF-u često je nedostavno, a znatan udio bolesnika ima vrlo ograničenu svijest o optimalnim obrascima i aktivnostima samoskrbi. Bolesnici često ne posjeduju znanje potrebno za prepoznavanje pogoršanja HF-a. Isto tako, događa se da bolesnici nisu upoznati s osnovnim ciljevima terapije, propisanim lijekovima, njihovim dozama i njihovom strateškom važnošću¹⁸⁻²⁰, što je uz stvarne ili subjektivno percipirane nuspojave lijekova često prepreka dugoročnom održavanju terapije²¹. Prema literaturi, bolesnici čak i nakon edukacije često ne smatraju svoje znanje o HF-u dovoljno dobrim. To potvrđuje i prethodna analiza Radne skupine za HF, u kojoj su svi bolesnici kompleksni edukacijski program smatrali korisnim⁷, premda je u 60 % sudionika dijagnoza HF-a bila već ranije postavljena. Time se dodatno naglašava nezamjenjiva uloga široke i praktične primjene strukturiranih, sveobuhvatnih programa edukacije bolesnika u skrbi za bolesnike s HF-om. Važne sastavnice strukturiranog programa edukacije jesu samoskrb i učinkovito usvajanje uz nju vezanih zadataka i aktivnosti. Kao što je prethodno pokazala Radna skupina za HF⁷, broj bolesnika koji su redovito provodili svakodnevne aktivnosti samoskrbi povećao se više nego trostruko nakon edukacijskoga programa.

Smjernice ESC-a za HF iz 2021. godine i praktične preporuke Udruženja za HF ESC-a iz iste godine ne pružaju detaljne i eksplicitne naputke o praktičnoj provedbi edukacije o samoskrbi; primjerice, ne sadržavaju preporuke o najprikladnijim edukacijskim modelima ili materijalima^{3,6}. Telemedicina, digitalni zdravstveni alati i integrirana edukacija bolesnika mogu znatno unaprijediti učinkovitost samoskrbi²². U istraživanju SMART-HF objavljenom 2022. godine istražen je učinak alata prikladnog za kućno praćenje simptoma, interaktivnu edukaciju i optimizaciju doze diuretika²³. Bolesnici koji su se koristili navedenim alatom pokazali su mnogo bolje ponašanje povezano sa samoskrbi, mjereno rezultatima EHFScB-9, u usporedbi s kontrolnom skupinom, a također je znatno sma-

Discussion

DISCUSSION

The optimization and sustained maintenance of therapy in patients with HF remain major challenges in everyday clinical practice^{13,14}. There are multiple points at which intervention may optimize care and maintain treatment over time; among these, one of the most important, simplest, and yet strategically most relevant elements is appropriate patient education¹⁵.

A meta-analysis published in 2024 that included data from 5446 patients demonstrated that patient education programmes involving specialist HF nurses also improve prognosis and may reduce HF rehospitalizations by as much as 25%¹⁶. An analysis by the Working Group on Heart Failure of the Central Hospital of Northern Pest-Military Hospital likewise confirmed that multidisciplinary care provided at a Heart Failure Outpatient Clinic with the involvement of a specialist HF nurse had a marked prognostic impact; in a propensity score-matched analysis, the composite endpoint of 1-year all-cause mortality and all-cause hospitalization was reduced by as much as 37.5%¹⁷. These findings further support the strategic importance of comprehensive patient education and multidisciplinary care delivered in dedicated HF outpatient settings with the involvement of specialist HF nurses.

According to everyday clinical experience, patients' knowledge of HF is frequently inadequate, and a substantial proportion of patients have very limited awareness of optimal self-care behaviors and activities. It is common for patients not to possess the knowledge necessary to recognize worsening HF. Likewise, it is not uncommon for them to be unaware of the basic goals of therapy, the medications prescribed, their dosages, and the strategic importance of these¹⁸⁻²⁰, which often constitutes a barrier to long-term treatment persistence, in addition to perceived or actual adverse drug effects²¹. According to the literature, even after patient education, patients often do not consider their knowledge of HF adequate. This is also supported by a previous analysis by our Working Group on Heart Failure, in which all patients considered the complex patient education programme useful⁷, even though 60% of the cohort had previously been diagnosed with HF. This further underscores the indispensable role of the broad, practical implementation of structured, comprehensive patient education programmes in the care of patients with HF. An important component of the structured patient education programme is self-care and the effective acquisition of related tasks. As previously demonstrated by our Working Group on Heart Failure⁷, following the educational programme, more than three times as many patients regularly performed daily self-care activities.

The 2021 ESC Heart Failure Guidelines and the 2021 practical management recommendations of the ESC Heart Failure Association do not provide detailed, explicit guidance on the practical implementation of self-care education; for example, on the most appropriate educational models or materials^{3,6}. Telemedicine, digital health tools, and integrated patient education may substantially improve the effectiveness of self-care²². In the SMART-HF study published in 2022, the impact of a tool suitable for home symptom monitoring, interactive education, and diuretic dose optimization was evaluated²³. Patients who used the tool demonstrated significantly better self-care behavior, as measured by EHFScB-9 scores, than the control group, and the number of days requiring hospital treatment for

njen broj dana bolničkog liječenja zbog HF-a. Abbasi *i sur.* usporedili su kombinirani edukacijski pristup (edukacija uživo, prezentacija, videodemonstracija i problemski zadatci) s isključivo multimedijском digitalnom edukacijskom metodom primjenjivom u kućnom okruženju. To je istraživanje utvrdilo da je kombinirani pristup doveo do najvećeg poboljšanja ponašanja povezanog sa samoskrbi²⁴. Također je važno naglasiti da se samoskrb može unaprijediti ne samo kvantitativnim edukacijskim čimbenicima, poput broja sati ili trajanja edukacije, nego i kvalitetom i sadržajem edukacijske intervencije²⁵.

Procijeniti učinkovitost samoskrbi u rutinskoj kliničkoj praksi može biti izazovno²⁶. Upitnici koji procjenjuju znanje povezano s bolešću često su vrlo složeni, a njihovo točno ispunjivanje može biti izvedivo samo u bolesnika s višom početnom razinom znanja, što znatno ograničava njihovu opću primjenjivost¹⁹. Na temelju rezultata upitnika Radne skupine za HF s 11 pitanja, edukacijska metoda primijenjena u ispitivanoj populaciji bila je učinkovita u poboljšanju samoskrbi i znanja o HF-u.

Međunarodno validirana ljestvica EHFSb-9 može biti koristan alat za procjenu svjesnog ponašanja povezanog sa samoskrbi i učinkovitosti edukacije o samoskrbi⁸. Prema literaturi, nakon pretvaranja u ljestvicu od 0 do 100, bodovni rezultat ≥ 70 može upućivati na odgovarajuću samoskrb⁹⁻¹¹. Primjenom ranije verzije te ljestvice s 12 pitanja, Pulignano *i sur.* utvrdili su da su bolesnici sa HF-om koji su sudjelovali u edukaciji o HF-u pokazivali povoljnije obrasce ponašanja vezanih uz samoskrb u usporedbi s bolesnicima bez edukacije²⁷. U ovoj analizi, prema rezultatima EHFSb-9, 86 % bolesnika primjenjivalo je odgovarajuću samoskrb tri mjeseca nakon edukacije. U sekundarnoj analizi istraživanja COACH-2 trajno optimalna samoskrb tijekom 12 mjeseci zabilježena je u 52 % bolesnika, pri čemu je bila definirana na sličan način kao u ovom istraživanju, odnosno EHFSb-9 bodovanjem manjim od 70¹⁰.

Na učinkovitost samoskrbi i edukacije usmjerene na njezino poboljšanje mogu utjecati brojni čimbenici, uključujući individualna klinička obilježja bolesnika – poput dobi, kognitivnih funkcija ili prisutnosti komorbiditeta – a također i složene interakcije čimbenika povezanih s bolešću i okolišem²⁸⁻³⁰. Socijalna izolacija i dulje trajanje bolesti u starijih bolesnika također mogu nepovoljno utjecati na svjesno donošenje odluka povezanih sa samoskrbi³⁰. Prema analizi Kamranija *i sur.*, u populaciji starijih bolesnika s HF-om analiziranoj s pomoću ljestvice EHFSb s 12 pitanja, 80,5 % bolesnika nije se svakodnevno vagalo ili je to činilo neadekvatno, 89,7 % nije primalo godišnje cijepljenje protiv gripe ili ga je primalo neadekvatno, a 55,4 % sudionika navelo je da nisu odgovarajuće obavijestili liječnika u slučaju naglog povećanja tjelesne mase³¹. Slične su rezultate objavili i Niriayo *i sur.* U njihovoj analizi 71,5 % bolesnika nije se svakodnevno vagalo, dok 75,6 % nije kontaktiralo liječnika u slučaju naglog porasta tjelesne mase¹¹. U tom su istraživanju prebivalište u ruralnim područjima, nepismenost, polifarmacija i prethodna hospitalizacija bili prediktori neadekvatne samoskrbi, što dodatno naglašava važnost iskorištavanja hospitalizacije zbog HF-a kao prilike za poboljšanje znanja bolesnika. Krhkost, definirana u Smjernicama ESC-a za HF iz 2021. godine kao multidimenzionalno i dinamičko stanje povezano s povećanom osjetljivošću na stresore neovisno o dobi, također može nepovoljno utjecati na ponašanje povezano sa samoskrbi^{3,29,32}. Multimorbiditet još je

HF was also significantly reduced. Abbasi *et al.* compared a combined-method educational approach (face-to-face education, slide presentation, video demonstration, and problem-solving tasks) with an exclusively multimedia-based digital educational method applicable in the home environment. The authors found that the combined -method approach produced the greatest improvement in patients' self-care behavior²⁴. It is also important to emphasize that self-care may be improved not only by the quantitative aspects of education, such as the number or duration of sessions, but also by the quality and content of the educational intervention²⁵.

The assessment of effective self-care may be challenging in routine practice²⁶. Questionnaires assessing disease-related knowledge are often highly complex, and their accurate completion may only be feasible in patient populations with higher baseline knowledge, which greatly limits their universal applicability¹⁹. Based on the results of our Working Group on Heart Failure's 11-item single-choice questionnaire, the educational method used in our study population was effective in improving both self-care and HF knowledge.

The internationally validated 9-item EHFSb-9 may serve as a useful tool for assessing conscious self-care behavior and the effectiveness of self-care education⁸. According to the literature, after transformation to a 0–100 scale, a score ≥ 70 may indicate adequate self-care⁹⁻¹¹. Using the earlier 12-item version of this scale, Pulignano *et al.* demonstrated that patients with HF who received HF education exhibited more favorable self-care behavior than those who did not²⁷. In the present analysis, based on the EHFSb-9 results, 86% of our patients showed adequate self-care 3 months after education. In a secondary analysis of the COACH-2 study, sustained optimal self-care was observed in 52% of patients over 12 months, defined similarly to the present study, based on an EHFSb-9 score of below 70¹⁰.

The effectiveness of self-care and education aimed at improving it may be influenced by several factors, including the individual clinical characteristics of the patient – such as age, cognitive function, or the presence of comorbidities – as well as the complex interactions between disease-related and environmental factors²⁸⁻³⁰. Social isolation and longer disease duration in older patients may also adversely affect conscious decision-making related to self-care³⁰. According to the analysis by Kamrani *et al.*, in their elderly HF patient population assessed with the 12-item EHFSb, 80.5% of patients did not weigh themselves daily or did so inadequately, 89.7% did not receive an annual influenza vaccination or did so inadequately, and 55.4% reported that they did not notify their physician appropriately in the event of sudden weight gain³¹. Similar findings were reported by Niriayo *et al.*; in their analysis, 71.5% of patients did not weigh themselves daily, while 75.6% did not contact their physician in the event of sudden weight gain¹¹. In that study, rural residence, illiteracy, polypharmacy, and previous hospitalization were all predictors of inadequate self-care, the latter further emphasizing the importance of using HF hospitalization as an opportunity to improve patient knowledge. Frailty, defined in the 2021 ESC Heart Failure Guidelines as a multidimensional and dynamic condition conferring increased vulnerability to stressors irrespective of age, may also adversely affect self-care behavior^{3,29,32}. Multimorbidity is another factor that may unfavorably influence self-care behavior and disease outcomes^{4,28,31}. In

jedan čimbenik koji može negativno utjecati na samoskrb i ishode bolesti^{4,28,31}. U ovoj analizi 61 % bolesnika imalo je najmanje dva komorbiditeta, što ilustrira složenost ispitivane kohorte. Iako razlike među studijskim populacijama otežavaju izravnu usporedbu s međunarodnim podacima, zanimljivo je istaknuti da je u Švedskom registru (*SwedeHF*), u kojem je srednja vrijednost dobi bila mnogo viša i iznosila 76 godina, 61,2 % bolesnika imalo najmanje četiri komorbiditeta³³.

Motivacija bolesnika, njihove navike, kulturna uvjerenja i vrijednosti, prethodna iskustva i sposobnosti, kao i dostupnost zdravstvene skrbi, mogu znatno utjecati na učinkovitost samoskrbi³⁴. Bahrodi *i sur.* identificirali su nedostatnu obiteljsku podršku kao uzrok suboptimalne samoskrbi³⁵, što dodatno ističe važnost uključivanja članova obitelji u strukturirani program edukacije bolesnika, u skladu s metodologijom primijenjenom u ovom modelu. Uz podršku društvene okoline, viša razina obrazovanja i veće povjerenje povezano sa zdravstvenom osviještenošću također mogu povoljno utjecati na samoskrb i kvalitetu života³⁶. Prema rezultatima logističke regresijske analize u okviru edukacijskog modela primijenjenog u skupini, obilježja bolesnika, uključujući dob, stupanj obrazovanja i komorbiditete, nisu utjecala na ponašanje povezano sa samoskrbi ni na učinkovitost edukacije o samoskrbi tijekom tromjesečnoga praćenja. Takav rezultat upućuje na to da se učinkovita samoskrb može postići kod širokog raspona bolesnika.

our analysis, 61% of patients had at least two comorbidities, illustrating the complexity of the studied cohort. Although differences between study populations hamper direct comparison with international data, it is noteworthy that in the Swedish Heart Failure Registry (*SwedeHF*), where the median age was considerably higher at 76 years, 61.2% of patients had at least four comorbidities³³.

Patients' motivations, habits, cultural beliefs and values, previous experiences and capabilities, as well as their access to healthcare, may all substantially impact the effectiveness of self-care³⁴. Bahrodi *et al.* identified inadequate family support as a cause of suboptimal self-care³⁵, which further highlights the importance of involving family members in the structured patient education programme, in line with the methodology applied in our model. In addition to greater social support, higher educational attainment and greater confidence related to health awareness may also favorably influence self-care and quality of life³⁶. Based on the results of our logistic regression analysis, under the educational model applied by our group, patient characteristics, including age, educational level, and comorbidities, did not influence self-care behavior or the effectiveness of self-care education at 3-month follow-up. These findings suggest that effective self-care can be achieved in a broad spectrum of patients.

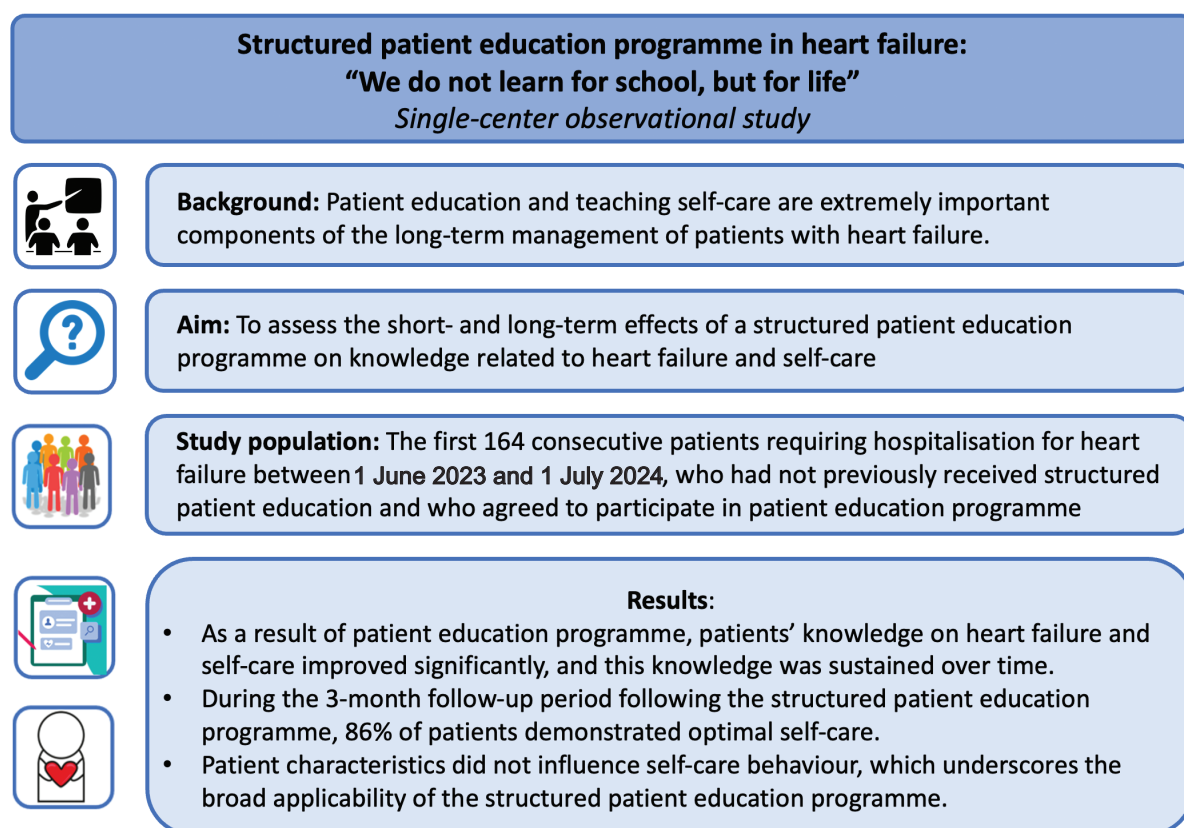


FIGURE 4. Graphical abstract.

OGRANIČENJA ISTRAŽIVANJA

Ovo je istraživanje ograničeno razmjerno malom veličinom uzorka i kratkim razdobljem praćenja. Upitnik s 11 pitanja s po jednim točnim odgovorom, koji je razvila i koristila Radna skupina za HF, nije prošao vanjsku validaciju, što može ograničiti njegovu opću primjenjivost. Ova analiza provedena u jednom centru uključivala je isključivo ispitanike kavkaske etničke pripadnosti; stoga se rezultati i zaključci ne mogu pouzdano primijeniti na druge etničke skupine. Nadalje, analizirani su samo bolesnici hospitalizirani u Jedinici za HF terciarnoga kardiološkog centra, što je moglo rezultirati specifičnom populacijom bolesnika. Zbog načina na koji je istraživanje oblikovano, cilj ove analize nije bio procijeniti prognostički učinak strukturiranog programa edukacije bolesnika ni njegov utjecaj na pridržavanje terapije.

Zaključci

Strukturirani programi edukacije bolesnika i optimizacija samoskrbi mogu imati neupitnu ulogu u dugoročnom liječenju bolesnika s HF-om.

Prikazani rezultati pokazuju da strukturirana edukacija bolesnika dovodi do znatnog poboljšanja znanja bolesnika te da se stečeno znanje dugotrajno održava (**slika 4**). Na temelju rezultata tromjesečnoga praćenja s pomoću EHFSB-9 bodovanja, 86 % bolesnika primjenjivalo je odgovarajuću samoskrb nakon strukturirane edukacije. Na samoskrb nisu utjecala obilježja bolesnika, uključujući dob, stupanj obrazovanja i komorbiditete, što upućuje na široku primjenjivost ovakvih programa.

Sukob interesa: autori izjavljuju da ne postoje sukobi interesa koji su mogli utjecati na pripremu ovoga teksta.

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Doprinosi autora: Autori su sudjelovali u pripremi teksta na sljedeći način:

Á. K., P. P. S.: pregled literature, prikupljanje podataka, pisanje teksta, izrada slika i tablica

F. B.-B.: pregled literature, prikupljanje podataka, pisanje teksta, statistička analiza, izrada slika i tablica, kritička revizija teksta, korekcije

E. M. B., G. T. G., Zs. F., L. F. H., B. S. G.: prikupljanje podataka, kritička revizija teksta

D. P., A. B., M. V., P. A., Zs. P.: kritička revizija teksta

B. M.: osmišljavanje i dizajn istraživanja, pregled literature, prikupljanje podataka, izrada slika i tablica, kritička revizija teksta, korekcije

LIMITATIONS

Our study is limited by the relatively small sample size and short follow-up duration. The 11-item single-choice questionnaire developed and used by our Working Group on Heart Failure has not undergone external validation, which may limit its universal applicability. Our single-centre analysis included individuals of Caucasian ethnicity exclusively; therefore, our results and conclusions cannot be reliably extrapolated to other ethnic groups. Furthermore, only patients hospitalized at the Heart Failure Unit of the Department of Adult Cardiology of our tertiary cardiology centre were analyzed, which may have resulted in a specific patient population. Owing to the study design, the present analysis was not intended to assess the prognostic impact of the structured patient education programme or its effect on medication adherence.

Conclusions

Structured patient education programmes and self-care optimization can play an unquestionable role in the long-term management of patients with HF.

Our results indicate that structured patient education leads to a significant improvement in patients' knowledge, and that this knowledge is durably retained (**Figure 4**). Based on the 3-month follow-up results assessed using the EHFSB-9, 86% of patients demonstrated adequate self-care following the structured patient education. Self-care was not influenced by patient characteristics, including age, educational level, and comorbidities, which supports the broad applicability of such programmes.

Conflicts of interest: The authors declare that they have no conflicts of interest that could have influenced the preparation of this manuscript.

Ethics approval: The study was approved by the National Scientific and Ethical Committee of Hungary (approval number: BM/27849-3/2024) and was conducted in accordance with the ethical principles of the Declaration of Helsinki.

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Author contributions: The authors contributed to the preparation of the manuscript as follows:

Á.K., P.P.S.: literature review, data collection, manuscript writing, preparation of figures and tables

F.B.-B.: literature review, data collection, manuscript writing, statistical analysis, preparation of figures and tables, critical revision of the manuscript, corrections

E.M.B., G.T.G., Zs.F., L.F.H., B.S.G.: data collection, critical revision of the manuscript

D.P., A.B., M.V., P.A., Zs.P.: critical revision of the manuscript

B.M.: study conception and design, literature review, data collection, preparation of figures and tables, critical revision of the manuscript, corrections

LITERATURE

- Lloyd-Jones DM, Larson MG, Leip EP, Beiser A, D'Agostino RB, Kannel WB, et al. Lifetime risk for developing congestive heart failure: the Framingham Heart Study. *Circulation*. 2002;106(24):3068-72. <https://doi.org/10.1161/01.CIR.0000039105.49749.6F>
- Mamas MA, Sperrin M, Watson MC, Coutts A, Wilde K, Burton C, et al. Do patients have worse outcomes in heart failure than in cancer? A primary care-based cohort study with 10-year follow-up in Scotland. *Eur J Heart Fail*. 2017;19(9):1095-104. <https://doi.org/10.1002/ehf.822>
- McDonagh TA, Metra M, Adamo M, Gardner RS, Baumach A, Böhm M, et al. 2021 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure. *Eur Heart J*. 2021;42(36):3599-726. <https://doi.org/10.1093/eurheartj/ehab368>
- Bánfi-Bacsárdi F, Kazay Á, Gergely TG, Forrai Z, Füzesi TP, Hanuska LF, et al. Therapeutic Consequences and Prognostic Impact of Multimorbidity in Heart Failure: Time to Act. *J Clin Med*. 2024 Dec 29;14(1):139. <https://doi.org/10.3390/jcm14010139>
- Jonkman NH, Westland H, Groenwold RH, Ágren S, Aienza F, Blue L, et al. Do Self-Management Interventions Work in Patients With Heart Failure? An Individual Patient Data Meta-Analysis. *Circulation*. 2016;133(12):1189-98. <https://doi.org/10.1161/CIRCULATIONAHA.115.018006>
- Jaarsma T, Hill L, Bayes-Genis A, La Rocca HB, Castiello T, Celutkienė J, et al. Self-care of heart failure patients: practical management recommendations from the Heart Failure Association of the European Society of Cardiology. *Eur J Heart Fail*. 2021;23(1):157-74. <https://doi.org/10.1002/ehf.2008>
- Bánfi-Bacsárdi F, Boldizsár EM, Gergely GT, Forrai Z, Kazay Á, Füzesi T, et al. [The role of complex patient education program in heart failure care]. *Orv Hetil*. 2024;165(37):1461-71. <https://doi.org/10.1556/650.2024.33121>
- Jaarsma T, Arestedt KF, Mårtensson J, Dracup K, Strömberg A. The European Heart Failure Self-care Behaviour scale revised into a nine-item scale (EHFScB-9): a reliable and valid international instrument. *Eur J Heart Fail*. 2009;11(1):99-105. <https://doi.org/10.1093/eurjhf/hfn007>
- Wagenaar KP, Broekhuizen BD, Rutten FH, Strömberg A, van Stel HF, Hoes AW, et al. Interpretability of the European Heart Failure Self-care Behaviour scale. *Patient Prefer Adherence*. 2017;11:1841-9. <https://doi.org/10.2147/PPA.S144915>
- Liljeroos M, Kato NP, van der Wal MH, Brons M, Luttik ML, van Veldhuisen DJ, et al. Trajectory of self-care behaviour in patients with heart failure: the impact on clinical outcomes and influencing factors. *Eur J Cardiovasc Nurs*. 2020;19(5):421-32. <https://doi.org/10.1177/1474515120902317>
- Niriayo YL, Yemane B, Asgedom SW, Teklay G, Gidey K. Prevalence and predictors of poor self-care behaviors in patients with chronic heart failure. *Sci Rep*. 2024;14(1):1984. <https://doi.org/10.1038/s41598-024-52611-5>
- Vellone E, Jaarsma T, Strömberg A, Fida R, Årestedt K, Rocco G, et al. The European Heart Failure Self-care Behaviour Scale: new insights into factorial structure, reliability, precision and scoring procedure. *Patient Educ Couns*. 2014;94(1):97-102. <https://doi.org/10.1016/j.pec.2013.09.014>
- Muk B, Pilecky D, Bánfi-Bacsárdi F, Füzesi T, Gergely GT, Komáromi A, et al. [The changes in the pharmacotherapy of heart failure with reduced ejection fraction and its effect on prognosis: experience in the Hungarian clinical practice]. *Orv Hetil*. 2024;165(18):698-710. <https://doi.org/10.1556/650.2024.33045>
- Muk B. Fókuszban a csökkent ejekciós frakciójú szívelégtelenség gyógyszeres kezelése. *Cardiologia Hungarica*. 2023;53:351-9. <https://doi.org/10.26430/CHUNGARICA.2023.53.4.351>
- Shahid I, Khan MS, Fonarow GC, Butler J, Greene SJ. Bridging gaps and optimizing implementation of guideline-directed medical therapy for heart failure. *Prog Cardiovasc Dis*. 2024;82:61-9. <https://doi.org/10.1016/j.pcad.2024.01.008>
- Tian C, Zhang J, Rong J, Ma W, Yang H. Impact of nurse-led education on the prognosis of heart failure patients: A systematic review and meta-analysis. *Int Nurs Rev*. 2024;71(1):180-8. <https://doi.org/10.1111/inr.12852>
- Muk B, Bánfi-Bacsárdi F, Vámos M, Pilecky D, Majoros Z, Török GM, et al. The Impact of Specialised Heart Failure Outpatient Care on the Long-Term Application of Guideline-Directed Medical Therapy and on Prognosis in Heart Failure with Reduced Ejection Fraction. *Diagnostics (Basel)*. 2024 Jan 6;14(2):131. <https://doi.org/10.3390/diagnostics14020131>
- Cline CM, Björck-Linné AK, Israelsson BY, Willenheimer RB, Erhardt LR. Non-compliance and knowledge of prescribed medication in elderly patients with heart failure. *Eur J Heart Fail*. 1999;1(2):145-9. [https://doi.org/10.1016/S1388-9842\(99\)00014-8](https://doi.org/10.1016/S1388-9842(99)00014-8)
- Strömberg A. The crucial role of patient education in heart failure. *Eur J Heart Fail*. 2005;7(3):363-9. <https://doi.org/10.1016/j.ejheart.2005.01.002>
- Sneed NV, Paul SC. Readiness for behavioral changes in patients with heart failure. *Am J Crit Care*. 2003;12(5):444-53. [PubMed: https://pubmed.ncbi.nlm.nih.gov/14503428/](https://pubmed.ncbi.nlm.nih.gov/14503428/)
- Rogers A, Addington-Hall JM, McCoy AS, Edmonds PM, Abern AJ, Coats AJ, et al. A qualitative study of chronic heart failure patients' understanding of their symptoms and drug therapy. *Eur J Heart Fail*. 2002;4(3):283-7. [https://doi.org/10.1016/S1388-9842\(01\)00213-6](https://doi.org/10.1016/S1388-9842(01)00213-6)
- Schuurin MJ, Treskes RW, Castiello T, Jensen MT, Casado-Arroyo R, Neubeck L, et al. Digital solutions to optimize guideline-directed medical therapy prescription rates in patients with heart failure: a clinical consensus statement from the ESC Working Group on e-Cardiology, the Heart Failure Association of the European Society of Cardiology, the Association of Cardiovascular Nursing & Allied Professions of the European Society of Cardiology, the ESC Digital Health Committee, the ESC Council of Cardio-Oncology, and the ESC Patient Forum. *Eur Heart J Digit Health*. 2024 Aug 30;5(6):670-682. <https://doi.org/10.1093/ehjdh/ztae064>
- Sahlin D, Rezaeezad B, Edvinsson ML, Bachus E, Melander O, Gerward S. Self-care Management Intervention in Heart Failure (SMART-HF): A Multicenter Randomized Controlled Trial. *J Card Fail*. 2022;28(1):3-12. <https://doi.org/10.1016/j.cardfail.2021.06.009>
- Abbasi A, Najafi Ghezleh T, Ashghali Farahani M, Naderi N. Effects of the self-management education program using the multi-method approach and multimedia on the quality of life of patients with chronic heart failure: A non-randomized controlled clinical trial. *Contemp Nurse*. 2018;54(4-5):409-20. <https://doi.org/10.1080/10376178.2018.1538705>
- Yehle KS, Plake KS. Self-efficacy and educational interventions in heart failure: a review of the literature. *J Cardiovasc Nurs*. 2010;25(3):175-88. <https://doi.org/10.1097/JCN.0b013e3181c71e8e>
- Van Spall HGC, Rahman T, Mytton Q, Ramasundarathetige C, Ibrahim Q, Kabali C, et al. Comparative effectiveness of transitional care services in patients discharged from the hospital with heart failure: a systematic review and network meta-analysis. *Eur J Heart Fail*. 2017;19(11):1427-43. <https://doi.org/10.1002/ehf.765>
- Pulignano G, Del Sindaco D, Minardi G, Tarantini L, Cioffi G, Bernardi L, et al. Translation and validation of the Italian version of the European Heart Failure Self-care Behaviour Scale. *J Cardiovasc Med (Hagerstown)*. 2010;11(7):493-8. <https://doi.org/10.2459/JCM.0b013e328335fbf5>
- Riegel B, Dickson VV, Vellone E. The Situation-Specific Theory of Heart Failure Self-care: An Update on the Problem, Person, and Environmental Factors Influencing Heart Failure Self-care. *J Cardiovasc Nurs*. 2022;37(6):515-29. <https://doi.org/10.1097/JCN.0000000000000919>
- Son YJ, Jang I. One-year trajectories of self-care behaviours and unplanned hospital readmissions among patients with heart failure: A prospective longitudinal study. *J Clin Nurs*. 2023;32(17-18):6427-40. <https://doi.org/10.1111/jocn.16658>
- Uchmanowicz I, Jankowska-Polańska B, Mazur G, Sivarajan Froelicher E. Cognitive deficits and self-care behaviors in elderly adults with heart failure. *Clin Interv Aging*. 2017;12:1565-72. <https://doi.org/10.2147/CIA.S140309>
- Kamrani AA, Foroughan M, Taraghi Z, Yazdani J, Kaldi AR, Ghanei N, et al. Self care behaviors among elderly with chronic heart failure and related factors. *Pak J Biol Sci*. 2014;17(11):1161-9. <https://doi.org/10.3923/pjbs.2014.1161.1169>
- Nakhjiri LZ, Darvishpour A, Pourghane P, Chaboki BG. The relationship between frailty syndrome and self-care ability in the elderly with heart failure. *J Educ Health Promot*. 2021;10:475. https://doi.org/10.4103/jehp.jehp_199_21
- Tomasoni D, Vitale C, Guidetti F, Benson L, Braunschweig F, Dahlström U, et al. The role of multimorbidity in patients with heart failure across the left ventricular ejection fraction spectrum: Data from the Swedish Heart Failure Registry. *Eur J Heart Fail*. 2024;26(4):854-68. <https://doi.org/10.1002/ehf.3112>
- Jaarsma T, Cameron J, Riegel B, Stromberg A. Factors Related to Self-Care in Heart Failure Patients According to the Middle-Range Theory of Self-Care of Chronic Illness: a Literature Update. *Curr Heart Fail Rep*. 2017;14(2):71-7. <https://doi.org/10.1007/s11897-017-0324-1>
- Bahrodi PS, Safa A, Ajorpaz NM, Avanjani FSI. Heart failure patients' experiences of self-care neglect: a content analysis. *BMC Cardiovasc Disord*. 2024;24(1):736. <https://doi.org/10.1186/s12872-024-04347-3>
- Koirala B, Dennison Himmelfarb CR, Budhathoki C, Davidson PM. Heart failure self-care, factors influencing self-care and the relationship with health-related quality of life: A cross-sectional observational study. *Heliyon*. 2020;6(2):e03412. <https://doi.org/10.1016/j.heliyon.2020.e03412>