Clinical pathways of patients with heart failure with preserved ejection fraction hospitalized for acute heart failure: Insights from the National Multi-Centre HF-POL Registry

Jacek T Niedziela[1], Mariusz Gąsior[1], Monika Budnik[2], Marek Gierlotka[3], Jarosław D Kasprzak[4], Bartosz Krakowiak[5], Paweł Krzesiński[6], Jadwiga Nessler[7], Agnieszka Pawlak[8], Anna Tomaszuk-Kazberuk[9], Krystian Wita[10], Małgorzata Lelonek[11], on behalf of HF-POL investigators

[1]3rd Department of Cardiology, Silesian Centre for Heart Diseases, Faculty of Medical Sciences in Zabrze, Medical University of Silesia, Katowice, Poland
[2]1st Department of Cardiology, Medical University of Warsaw, Warszawa, Poland
[3]Department of Cardiology, University Hospital, Institute of Medical Sciences, University of Opole, Opole, Poland
[4]1st Department of Cardiology, Medical University of Lodz, Bieganski Regional Specialty Hospital in Lodz, Łódź, Poland
[5]Department of Cardiology, 4th Clinical Military Hospital, Wrocław, Poland
[6]Department of Cardiology and Internal Diseases, Military Institute of Medicine-National Research Institute, Warszawa, Poland
[7]Department of Coronary Disease and Heart Failure, Institute of Cardiology, Jagiellonian University Medical College, Kraków, Poland
[8]Department of Cardiology, National Medical Institute of the Ministry of the Interior and Administration, Warszawa, Poland
[9]Department of Cardiology, Lipidology and Internal Medicine with Intensive Cardiac Care Unit, Medical University of Bialystok, Białystok, Poland
[10]Cardiovascular Intensive Care Unit, Leszek Giec Upper-Silesian Medical Centre of the Silesian Medical University in Katowice, Katowice, Poland
[11]Department of Noninvasive Cardiology, Medical University of Lodz, Łódź, Poland

Correspondence to:
Jacek T Niedziela, MD, PhD,
3rd Department of Cardiology,
Silesian Centre for Heart Disease,
Faculty of Medical Sciences in Zabrze,
Medical University of Silesia,
Curie-Skłodowskiej 9, 41–800 Zabrze,
phone: +32 373 38 60,
e-mail: jniedziela@sccs.pl

DOI: 10.33963/v.phj.102881

Received:
July 18, 2024

Accepted:
September 27, 2024

Early publication date:
October 8, 2024

INTRODUCTION

Heart failure with preserved ejection fraction (HFpEF) accounts for approximately half of heart failure (HF) cases worldwide [1, 2]. In recent years, significant efforts have been made to draw attention to patients with HFpEF, as these patients face a risk of death comparable to those with heart failure with reduced ejection fraction [1, 2]. Furthermore, the causes of death in HFpEF patients often extend beyond cardiology, reflecting multimorbidity prevalent in this population [3]. Understanding the clinical journey and care schemes for HFpEF patients could significantly contribute to optimizing healthcare organization and improving prognoses. Our study aimed to describe the real-life care pathways for patients before and during hospitalization for acute HF in Polish HFpEF patients with and without a history of previous HF hospitalization.

METHODS

Data source

The data was provided by the Heart Failure Poland (HF-POL) study, a multicenter observational registry including patients with HF and left ventricular ejection fraction >40%, conducted by the Heart Failure Association of the Polish Cardiac Society in cooperation with the Committee for Clinical Initiatives of the Executive Board as part of the Scientific Platform initiative. The HF-POL study included patients with diagnosed HF (according to the 2021 European Society of Cardiology guidelines), with documented ventricular ejection fraction >40%, who were either treated for HF on ambulatory basis or hospitalized for HF (HF exacerbation or HF *de novo*) with administration of intravenous therapy (diuretics and/or catecholamines and/or nitrates) [4]. The rationale and design of the HF-POL registry and baseline characteristics of all patients enrolled in the database were previously described [5, 6]. Our study included hospitalized HFpEF patients (EF ≥50%) who met the inclusion criteria of the HF-POL study. The study was registered in the ClinicalTrials.gov database (NCT06030661).

Study group

The study included all HFpEF patients hospitalized for acute (*de novo* or decompensated)

HF requiring administration of intravenous therapy and reported to the HF-POL Registry. Patients were assigned to two groups: without (n = 444) and with (n = 91) a history of previous heart failure hospitalization (HFH).

Statistical analysis

The normality of the variables was verified using the Shapiro–Wilk normality test. None of the continuous variables had normal distribution; thus, they were described as medians and interquartile ranges. The number of observations and the corresponding percentage (%) were given for categorical variables. The non-parametric Mann–Whitney U test was used to compare two independent groups. Pearson's χ^2 test of independence (with Yates correction where necessary) was used to compare qualitative variables between groups. Results with $P < 0.05$ were considered significant. STATISTICA PL v. 13.3 and PQStat 1.8.6 packages were used for calculations.

RESULTS AND DISCUSSION

The study included 535 patients with HFpEF hospitalized for acute HF, of whom 91 (17.0%) had at least one HFH in the last 12 months. The median age of patients was 76 (69–84) and 76 (72–84) for patients without and with at least one previous HFH, respectively. The EF median was 55 (52–60) in both groups, and N-terminal pro B-type natriuretic peptide levels were 2072 (896–4791) and 2542 (1125–5394) pg/ml, respectively. More than half of the patients (51.7%) with HFH had at least three episodes of hospitalization for HF in the last 12 months. The baseline characteristics are presented in Table 1.

Patients in both groups had similar age, sex, body mass index, heart rate, systolic and diastolic blood pressure, and N-terminal pro B-type natriuretic peptide levels. There were no differences in the clinical presentation on hospital admission. The main difference in the medical history was the etiology of heart failure, with a significantly higher percentage of ischemic HF in patients with prior HFH. This was associated with a more frequent history of myocardial infarction, percutaneous coronary intervention, and coronary artery bypass grafting in this group. Patients without previous HFH more often had non-cardiovascular comorbidities (Table 1).

Patients with HFpEF and a history of at least one HFH were twice as likely to have a visit to outpatient centers before admission. Moreover, they were almost exclusively hospitalized in cardiology departments, while individuals without prior HFH were equally distributed between internal medicine and cardiology departments. Most patients without HFH were transferred to the hospital by emergency services — hospital emergency department and ambulance service. Individuals with HFH were mainly referred by general practitioners (GPs) and outpatient centers (Table 1).

Our study, which analyzed the clinical pathways of HFpEF patients in the Polish healthcare system, shows some important facts. Firstly, most patients with the first HFH are referred to the hospital by emergency services. This suggests an insufficient awareness of heart failure among patients and GPs. Most patients admitted for the first time with acute HF presented symptoms that had been developing over a long period. If patients had appropriate awareness of HF signs and symptoms, they would consult a primary care physician in advance to avoid disease exacerbation, which would result in a referral to the hospital.

The primary intervention during hospitalization was intravenous diuretic therapy. Both GPs and educated, cooperating patients (self-managing HF) should be encouraged to intensify oral diuretics therapy in the initial phase of HF exacerbation to avoid urgent HFH. Secondly, almost all patients subsequently hospitalized for heart failure were admitted to the cardiology department. To efficiently distribute healthcare resources, patients should be triaged for an appropriate department specialization, depending on the clinical stage of the disease. Not all patients with HF exacerbation require hospitalization in cardiology departments. However, our results may be biased because the HF-POL registry gathered data from selected hospitals in Poland, most of which were cardiology centers. Nevertheless, there is a need to create mechanisms to treat patients with mild HF in regional centers and to refer patients with more severe HF to tertiary centers. Lastly, the frequency of sodium-glucose co-transporter 2 use may be lower than expected because patients were enrolled before the last focus update of the European Society of Cardiology guidelines. Therefore, patients had sodium-glucose co-transporter 2 administered for diabetes mellitus-related indications and not HF. Some of the problems mentioned above were described in detail in the expert opinion of the Heart Failure Association of the Polish Cardiac Society [7].

To conclude, the analysis of data on the clinical journey of HFpEF patients from the HF-POL registry hospitalized for acute HF showed significant differences in the management of hospital treatment between patients with and without a previous history of hospitalization for acute HF. Some of those observed elements require further analysis and optimization.

Article information

Conflict of interest: None declared.

Funding: None.

Table 1. Baseline characteristics and clinical pathways of patients with heart failure with preserved ejection fraction with and without previous heart failure hospitalization (HFH)

	Without previous HFH n = 444	With at least one previous HFH n = 91	*P*-value
Age, median (IQR), years	76 (69–84)	76 (72–84)	0.28
Females, n (%)	194 (43.7)	35 (38.5)	0.36
BMI, median (IQR), mm Hg	29 (25–33)	29 (26–32)	0.87
SBP, median (IQR), mm Hg	130 (115–145)	130 (120–145)	0.65
DBP, median (IQR), mm Hg	76 (70–83)	73 (66–83)	0.63
HR, median (IQR), bpm	77 (70–90)	79 (64–95)	0.75
Ischemic etiology, n (%)	109 (24.6)	38 (41.8)	<0.001
NYHA at admission, n (%)			
NYHA I	19 (4.3)	3 (3.3)	
NYHA II	98 (22.1)	20 (22.0)	
NYHA III	156 (35.1)	53 (58.2)	<0.001
NYHA IV	113 (25.5)	15 (16.5)	
No data	58 (13.1)	0	
EF, median (IQR), %	55 (50–58)	55 (52–60)	0.008
NT-proBNP, median (IQR), pg/ml	2072 (896–4791)	2542 (1125–5394)	0.27
GFR, median (IQR), ml/kg/1.73 m^2	55 (40–61)	52 (41–67)	0.78
Length of hospital stay, median (IQR), days			
Past medical history			
Prior heart failure, n (%)	279 (62.8)	91 (100)	<0.001
No. of previous HFH			
1	0	23 (25.3)	
2	0	21 (23.1)	–
≥3	0	47 (51.7)	
Hypertension, n (%)	362 (81.5)	78 (85.7)	0.34
Hyperlipidemia, n (%)	198 (44.6)	65 (71.4)	<0.001
Diabetes mellitus, n (%)	162 (36.5)	38 (41.8)	0.34
Obesity, n (%)	147 (33.2)	37 (40.7)	0.17
Chronic kidney disease, n (%)	96 (21.6)	33 (36.3)	0.027
Atrial fibrillation, n (%)	210 (47.30)	68 (74.7)	<0.001
Myocardial infarction, n (%)	58 (12.9)	24 (25.3)	0.001
Stroke, n (%)	40 (9.0)	8 (8.8)	0.95
Peripheral arterial disease, n (%)	26 (5.9)	9 (9.9)	0.16
Smoking, n (%)			
Current	43 (9.7)	6 (6.6)	
Former	159 (35.8)	22 (24.2)	0.035
Never	242 (54.5)	63 (69.2)	
COPD, n (%)	81 (18.2)	8 (8.8)	0.027
History of SARS-CoV-2, n (%)	65 (14.6)	17 (18.7)	0.33
Procedures before admission			
History of PCI, n (%)	81 (18.2)	29 (31.9)	0.003
History of CABG, n (%)	24 (5.4)	11 (12.1)	0.019
History of cardiac ablation, n (%)	15 (3.4)	4 (4.4)	0.78
Implanted pacemaker, n (%)	71 (16.0)	17 (18.7)	0.53
Implanted ICD/CRT-P/CRT-D, n (%)	9 (2.0)	0	-
Clinical presentation of HF at hospital admission			
Peripheral oedema, n (%)	248 (55.9)	54 (59.3)	0.54
Pulmonary congestion, n (%)	158 (35.6)	42 (46.2)	0.06
Pleural effusion, n (%)	96 (21.6)	27 (29.7)	0.1
Hepatomegaly, n (%)	48 (10.8)	13 (14.3)	0.34
Jugular vein distention, n (%)	33 (7.4)	6 (6.6)	0.78
Clinical profile (the Forrester classification), n (%)			
Warm-dry	80 (18.0)	37 (40.7)	
Warm-wet	321 (72.3)	52 (57.1)	<0.001
Cold-dry	9 (2.0)	2 (2.2)	
Cold-wet	34 (7.7)	0	

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Table 1. (cont.) Baseline characteristics and clinical pathways of patients with heart failure with preserved ejection fraction with and without previous heart failure hospitalization (HFH)

Medications during hospitalization			
	Without previous HFH n = 444	With at least 1 previous HFH n = 91	*P*-value
Inotropes, n (%)	59 (13.3)	5 (5.5)	0.037
Intravenous diuretics, n (%)	409 (92.1)	62 (68.1)	<0.001
Intravenous nitrates, n (%)	178 (40.1)	30 (33.0)	0.2
ACEi, n (%)	237 (53.4)	48 (52.8)	0.91
ARB, n (%)	59 (13.3)	22 (24.2)	0.008
Beta-blockers, n (%)	355 (80.0)	84 (92.3)	0.005
MRA, n (%)	217 (48.9)	40 (44.0)	0.39
SGLT-2i, n (%)	46 (10.4)	23 (25.3)	<0.001
Outpatient clinic visits before admission			
Cardiologist, n (%)	150 (33.8)	81 (89.0)	<0.001
Internal medicine, n (%)	126 28.4)	55 (60.4)	<0.001
Diabetologist, n (%)	37 (8.3)	21 (23.1)	<0.001
Pneumologist, n (%)	22 (5.0)	10 (11.0)	0.027
Nephrologist, n (%)	16 (3.6)	9 (9.9)	0.01
Department of hospitalization			
Internal medicine, n (%)	226 (50.9)	1 (1.1)	
Cardiology, n (%)	216 (48.7)	90 (98.9)	<0.001
ER with no data on admission, n (%)	2 (0.4)	0	
Where patients were referred form			
General practitioner, n (%)	108 (24.5)	27 (29.7)	
Ambulance service, n (%)	146 (33.1)	7 (7.7)	
Emergency department, n (%)	139 (31.5)	34 (37.4)	
Outpatient clinic, n (%)	48 (10.9)	23 (25.3)	<0.001
Where patients were discharged to			
Home, n (%)	189 (42.6)	72 (79.2)	
Another hospital, n (%)	14 (3.1)	5 (5.5)	<0.001
Social welfare home, n (%)	2 (0.5)	1 (1.1)	
No data, n (%)	239 (53.8)	13 (14.3)	

Abbreviations: ACEi, angiotensin-converting enzyme inhibitors; ARB, angiotensin receptor blockers; BMI, body mass index; CABG, coronary artery bypass grafting; COPD, chronic obstructive pulmonary disease; CRT-D, cardiac resynchronization therapy defibrillator; CRT-P, cardiac resynchronization therapy pacemaker; DBP, diastolic blood pressure; EF, ejection fraction; GFR, glomerular filtration rate; HF, heart failure; HFH, heart failure hospitalization; HR, heart rate; ICD, implantable cardioverter-defibrillator; IQR, interquartile range; MRA, mineralocorticoid receptor blocker; NT-proBNP, N-terminal pro-B-type natriuretic peptide; NYHA, New York Heart Association; PCI, percutaneous coronary intervention; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2; SBP, systolic blood pressure; SGLT2i, sodium-glucose co-transporter 2 inhibitors

REFERENCES

1. McDonagh TA, Metra M, Adamo M, et al. 2021 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure. Eur Heart J. 2021; 42: 3599–3726, doi: 10.1093/eurheartj/ehab368, indexed in Pubmed: 34447992.
2. Heidenreich PA, Bozkurt B, Aguilar D, et al. 2022 AHA/ACC/HFSA Guideline for the Management of Heart Failure: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. Circulation. 2022; 145: e895–e1032, doi: 10.1161/CIR.0000000000001063, indexed in Pubmed: 35363499.
3. Vergaro G, Ghionzoli N, Innocenti L, et al. Noncardiac versus cardiac mortality in heart failure with preserved, midrange, and reduced ejection fraction. J Am Heart Assoc. 2019; 8(20): e013441, doi: 10.1161/JAHA.119.013441, indexed in Pubmed: 31587602.
4. Bozkurt B, Coats AJ, Tsutsui H, et al. Universal definition and classification of heart failure: A report of the Heart Failure Society of America, Heart Failure Association of the European Society of Cardiology, Japanese Heart Failure Society and Writing Committee of the universal definition of heart failure. J Card Fail. 2021; 27(4): 387–413, doi: 10.1016/j.cardfail.2021.01.022, indexed in Pubmed: 33663906.
5. Major K, Sawościan M, Budnik M, et al. Baseline characteristics of Polish patients with heart failure with ejection fraction >40%: Results of HF-POL, the first study of the Heart Failure Association. Pol Heart J. 2024; 82(4): 427–430, doi: 10.33963/v.phj.99195, indexed in Pubmed: 38493459.
6. Lelonek M, Gąsior M, Grabowski M. The HF-POL study — the first real-life multicenter study of Polish patients with heart failure and left ventricular ejection fraction >40%: Study rationale and design. Kardiol Pol. 2022; 80(11): 1145–1147, doi: 10.33963/KP.a2022.0237, indexed in Pubmed: 36283124.
7. Lelonek M, Pawlak A, Straburzyńska-Migaj E, et al. Identification and therapy for patients with heart failure with preserved ejection fraction: An expert opinion of the Heart Failure Association of the Polish Cardiac Society. Pol Heart J. 2024; 82(2): 247–254, doi: 10.33963/v.phj.98878, indexed in Pubmed: 38230496.