POLISH HEART JOURNAL

Kardiologia Polska
The Official Peer-reviewed Journal of the Polish Cardiac Society since 1957

Online first
This is a provisional PDF only. Copyedited and fully formatted version will be made available soon

ISSN 0022–9032 e-ISSN 1897–4279

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

Authors: Jacek T Niedziela, Mariusz Gąsior, Monika Budnik, Marek Gierlotka, Jarosław D Kasprzak, Bartosz Krakowiak, Paweł Krzesiński, Jadwiga Nessler, Agnieszka Pawlak, Anna Tomaszuk-Kazberuk, Krystian Wita, Małgorzata Lelonek

Article type: Short communication

Received: July 18, 2024

Accepted: September 27, 2024

Early publication date: October 8, 2024

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

Short title: Clinical pathways of HFpEF patients with HFH in 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

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 the multimorbidity prevalent among 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 due to acute HF in the Polish HFpEF population, comparing those with and without previous HF hospitalization.

METHODS

Data source

The data was provided by the Heart Failure Poland (HF-POL) study, a multicenter observational study 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 who had recognized HF (according to the 2021 European Society of Cardiology guidelines) with documented ventricular ejection fraction >40% and 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 includes patients with HFpEF (EF ≥50%) who were hospitalized according to the inclusion criteria of the HF-POL

study. The study has been registered in the ClinicalTrials.gov database with identifier NCT06030661.

Study group

The study included all patients with HFpEF hospitalized due to acute (de novo or decompensated) HF requiring administration of intravenous therapy and reported to the HF-POL Registry. Patients were divided into two groups: without (n = 444) and with (n = 91) previous hospitalization due to heart failure (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 with the median and interquartile range. 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 groups for qualitative variables. Results with P <0.05 were considered significant. The 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 due to acute HF, of which 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 median of EF was 55 (52–60) in both groups and N-terminal pro-B-type natriuretic peptide levels 2072 (896–4791) and 2542 (1125–5394) pg/ml, respectively. More than half of the patients (51.7%) with previous HFH had at least three hospitalizations due to HF in the last 12 months. The baseline characteristics are presented in Table 1.

Patients in both groups were similar in age, sex, body mass index, heart rate, systolic and diastolic blood pressure, and N-terminal pro-B-type natriuretic peptide concentrations. There were no differences in the clinical presentation at hospital admission. The main difference in 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 previous HFH were twice as likely to have a visit to the outpatient clinics 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 previous HFH were transferred to the hospital by emergency services — hospital emergency department and ambulance service. Individuals with previous HFH were mainly referred by general practitioners (GPs) and outpatient clinics (Table 1).

Our study, which analyzes 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. In case of the appropriate awareness of HF signs and symptoms, patients should consult a primary care physician in advance to avoid exacerbation of the disease, resulting in the need for hospitalization. The primary intervention during hospitalization was intravenous diuretic therapy. Both GPs and educated, cooperating patients (self-management of HF) should be encouraged to intensify the oral diuretics therapy in the initial phase of HF exacerbation to avoid urgent HFH. Secondly, almost all patients with subsequent hospitalizations due to heart failure were admitted to the cardiology department. To efficiently distribute healthcare resources, patients should be triaged for the appropriate department specialization depending on the clinical advancement of the disease. Not all patients with exacerbation of HF 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 high-reference 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 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 due to acute HF showed significant differences in the

management of hospital treatment between patients with and without previous hospitalization due to acute HF. Some of those observed elements require further analysis and optimization.

Article information

Conflict of interest: None declared.

Funding: None.

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.

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 NYHA II NYHA III NYHA IV No data	 19 (4.3) 98 (22.1) 156 (35.1) 113 (25.5) 58 (13.1)	 3 (3.3) 20 (22.0) 53 (58.2) 15 (16.5) 0	<0.001
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 2 ≥3	 0 0 0	 23 (25.3) 21 (23.1) 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 Former Never	 43 (9.7) 159 (35.8) 242 (54.5)	 6 (6.6) 22 (24.2) 63 (69.2)	0.035
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** **Warm-wet** **Cold-dry** **Cold-wet**	 **80 (18.0)** **321 (72.3)** **9 (2.0)** **34 (7.7)**	 **37 (40.7)** **52 (57.1)** **2 (2.2)** **0**	**<0.001**
Medications during hospitalization			
	Without previous HFH n = 444	With at least 1 previous HFH n = 91	*P*
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)	<0.001
Cardiology, n (%)	216 (48.7)	90 (98.9)	
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)	<0.001
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)	
Where patients were discharged to			
Home, n (%)	189 (42.6)	72 (79.2)	<0.001
Another hospital, n (%)	14 (3.1)	5 (5.5)	
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