Improved prognosis in patients with recurrent hospitalizations for heart failure after day-care management

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Introduction Heart failure (HF) is a major health and financial burden worldwide. Despite the advances in cardiology, the prevalence of HF is increasing and the outcomes remain poor. In 90-day follow-up after HF hospitalization, hospital readmission and readmission rates are 21% to 47% and 8% to 16%, respectively, and are supposed to be higher in patients with refractory HF.[1,2] Although the "transition phase" is the most vulnerable period after hospital discharge, 75% of readmissions in this time may be preventable.[3] The European Society of Cardiology guidelines recommended for the first time that patients with HF should be enrolled in a multidisciplinary care management program to reduce not only the risk of HF hospitalization but also mortality (Class I, level of recommendation A).[4] The first well described day-care HF unit (DCHFU) with multidisciplinary management program was introduced at the Sheba Medical Centre, Israel. The safety of the day-care service among patients with advanced HF was confirmed with lower than expected rates of hospital readmission and mortality.[5] DCHFUs were also introduced as an element of the coordinated heart failure care program (Kompleksowa Opieka w Niewydolności Serca) by the Polish Ministry of Health in 2018.[6] We hypothesized that the individualized and comprehensive treatment in a DCHFU aimed at maintaining the effect of the hospital treatment may improve the prognosis also among those with recurrent rehospitalizations. The purpose of the study was to determine the effects of treatment in a DCFHU on the outcomes in patients with refractory HF, including hospital readmissions and survival. The second aim was to analyze the insurer's costs of treatment in DCHFUs.

Methods A day-care HF unit was founded at the 3rd Department of Cardiology, Silesian Centre for Heart Diseases in Zabrze, Poland, a tertiary cardiovascular hospital. The unit was equipped with 3 comfortable chairs with vital function monitors and infusion pumps. Visits were scheduled for each patient individually, depending on the current clinical status, and were conducted by a dedicated HF nurse and physician. In the stable phase of HF, patients had 1 to 3 visits per month, and in case of clinical problems, the visits were scheduled even 2 to 3 times a week. During each visit, physical examination was performed with measurement of body weight, blood pressure and saturation, electrocardiogram, and laboratory tests. Additional tests, including chest X-ray, transthoracic echocardiography, interrogation of implantable cardioverter defibrillator (ICD) or cardiac resynchronization therapy with defibrillator (CRT-D) device were also available. Drugs, including intravenous diuretic, dobutamine, and potassium supplementation were also administered when needed. Patients had the possibility of telephone contact with the unit and those with implanted ICD/CRT-D were monitored remotely.

Only optimally decongested patients with class II-IV HF according to the New York Heart Association functional classification with all possible reparative procedures performed (revascularization, correction of valvular disease, ablation), implanted ICD/CRT-D if applicable,

TABLE 1 Characteristics at baseline and during the treatment at a day-care heart failure unit (continued on the next page)

Parameter		Value
Number of visits		2426
Number of patients		83
Treatment time in DCHFU / follow-up, d, median (IQR)		268 (623)
Visits per patient per month, n, mean (SD)		3.7 (2.7)
Age, y, mean (SD)		62.2 (10.7)
Female sex, %		12.1
BMI, kg/m^2, median (IQR)		26.5 (6.0)
Ischemic etiology, %		62.7
History of arterial hypertension, %		65
History of atrial fibrillation, %		71
History of VT/VF, %		33
History of stroke, %		15
History of diabetes mellitus, %		43
History of chronic kidney disease, %		59
NYHA class, %	I	0
	II	45
	III	44
	IV	11
LVEF, %, median (IQR)		18.0 (7.5)
LVEDD, mm, median (IQR)		70.0 (13.0)
LVEDV, ml, mean (SD)		233 (92)
NT-proBNP, pg/ml, median (IQR)		3656 (4225)
Distance from home to DCHFU, km, median (IQR)		15.7 (19.4)
ICD/CRT-D, %		91
Remote monitoring of ICD/CRT-D, %		82
Loop diuretic, %		100
β-Blocker, %		97
β-Blocker, % of recommended dose		55
ACEI/ARB/ARNI, %		64
ACEI/ARB/ARNI, % of recommended dose		35
MRA, %		94
MRA, % of recommended dose		98
Thiazide, %		30
Digoxin, %		33
Ivabradine, %		12
Allopurinol, %		76
Potassium supplementation, %		73
OAC/NOAC, %		79
Visits with loop diuretic administration IV, %		60
Visits with potassium supplementation, %		21
Visits with ICD/CRT-D interrogation, %		5.4
Visits with TTE, %		2.8

and with at least 2 unplanned hospitalizations for HF during preceding 6 months were included in the study during HF hospitalization.

At baseline, the medical history, clinical and biochemical parameters, as well as data on drugs and procedures were recorded and the estimated survival time and probability of 12-month survival were calculated using the Seattle Heart Failure Model (SHFM) Calculator version 2.10000.[7]

The all-cause death, hospitalizations for acute HF, and heart transplantation (HTx) or left ventricular assist device implantations were analyzed.

The treatment costs to the Polish National Health Fund (Narodowy Fundusz Zdrowia [NFZ]), the only Polish public insurer, for the 6-month period before inclusion were calculated as the cost of 2 hospitalizations due to HF according to the NFZ estimation. The overall costs to the NFZ during the 6-month treatment in DCHFUs were calculated as the summary costs of all visits in DHCFUs (accounted for outpatient clinic) and all unplanned hospitalizations for acute HF according to the NFZ estimation.

Statistical analysis Continuous variables with normal distribution were presented as means (SD) and those with other than normal distribution as medians (IQR). Categorical variables were presented as percentages.

The investigation conforms with the principles outlined in the Declaration of Helsinki. The study was approved by the Bioethics Committee of the Medical University of Silesia (KNW/0022/KB1/150/15/16).

Results and discussion A total of 83 patients were enrolled in the study. During the median (IQR) follow-up of 268 (623) days, 2426 visits were recorded. The baseline characteristics and main results are presented in TABLE 1. There were no serious adverse events during the visits in the DCHFU. During the 6-month treatment in the DCHFU, 3.3% of patients had 2 hospital readmissions due to HF decompensation compared with at least 2 hospitalizations for acute HF in all participants in the same period before inclusion to the DCHFU. Among patients who completed a 12-month follow-up, the median (IQR) of estimated 12-month survival rate according to the SHFM was 55.8% (54.0%), while the observed 12-month survival reached 76.1%. The average treatment costs to the NFZ during the 6-month period before inclusion to the DCHFU were 2.9-fold higher than during the first 6 months of treatment in the DCHFU (TABLE 1).

Patients included in the study were younger and had higher prevalence of comorbidities than the average Silesian population of HF patients.[8] Comparing with HF patients in COMMIT-HF (Contemporary Modalities in Treatment of Heart Failure) registry, the age was similar, but the prevalence of comorbidities and

TABLE 1 Characteristics at baseline and during the treatment at a day-care heart failure unit (continued from the previous page)

Parameter	Value
Patients who underwent LVAD implantation or HTx, %	33.7
At least 1 hospital readmission due to acute HF during the whole follow-up[a], %	42.2
At least 1 hospital readmission due to acute HF during 6-month follow--up[a], %	27.7
At least 2 hospital readmissions due to acute HF during the whole follow-up[a], %	13.3
At least 2 hospital readmissions due to acute HF during 6-month follow-up[a], %	3.6
The probability of 12-month survival estimated by SHFM in time of inclusion to DCHFU, %, median (IQR)[b]	55.8 (54.0)
The estimated survival time according to SHFM, y, median (IQR)[b]	1.65 (4.4)
Survival in 12-month follow-up[b], %	76.1
The insurer costs of 6-month treatment before inclusion to DCHFU per patient, PLN[c]	6908
The insurer costs of 6-month treatment after inclusion to DCHFU per patient, PLN[c]	2385

a Hospitalizations related to the heart transplantation were not included.

b Analysis for patients who completed the 12-month follow-up in the DCHFU (n = 46)

c 1 PLN = 0.23 EUR

Abbreviations: ACEI, angiotensin-converting enzyme inhibitors; ARB, angiotensin II receptor blockers; ARNI, angiotensin receptor-neprilysin inhibitor; BMI, body mass index; CRT-D, cardiac resynchronization therapy defibrillator; DCHFU, day-care heart failure unit; HF, heart failure; HTx, heart transplantation, ICD, implantable cardioverter defibrillator; IQR, interquartile range; IV, intravenous; LVAD, left ventricular assist device; LVEDD, left ventricular end diastolic diameter; LVEDV, left ventricular end diastolic volume; LVEF, left ventricular ejection fraction; MRA, mineralocorticoid receptor antagonist; NOAC, non-vitamin K antagonist oral anticoagulants; NT-proBNP, N-terminal pro-B-type natriuretic peptide; NYHA, New York Heart Association functional classification; OAC, oral anticoagulation therapy; SHFM, Seattle Heart Failure Model; TTE, transthoracic echocardiography; VF, ventricular fibrillation; VT, ventricular tachycardia

concentrations of N-terminal pro-B-type natriuretic peptide were higher, while left ventricular ejection fraction was considerably lower.[9]

We showed that simple but individualized care in the day-care unit may reduce the rate of hospital readmissions for acute HF and insurer costs as well as improve the 12-month survival comparing with the SHFM estimations. Our findings suggest that the DCHFU may be designed as a bridge therapy for patients qualified for HTx (36% of patients) or the observation list (24%), but also as a destination therapy for patients without the possibility of implanting left ventricular assist device or HTx (40%).

According to our experience, the day-care treatment may be beneficial only to decongested patients who were treated optimally and had all corrective procedures performed. Patients with acute HF should be referred immediately to the hospital emergency department. Such an approach, also recommended by the European Society of Cardiology guidelines, should be similar to acute coronary syndromes management according to the "time is organs" principle. Another important issue is patient cooperation, including self-management, drug compliance, and possibility of visiting the DCHFU on their own. Patients with dementia and/or frailty should be probably referred for palliative treatment in a nursing home or hospice. Patients with mild symptoms of HF or those with low risk of HF hospitalization (without previous HF hospitalizations), should be treated in outpatient clinics.

The study has some limitations. There was no control group or possibility of data collection in similar population without treatment in the DCHFU. Thus, the results should be interpreted with caution as the only comparison may be done with estimated data or data available in other publications. However, in readmission and cost analyses, the control group was composed of the same patients treated in the same period before inclusion to the DCHFU. The overall costs of the DCHFU for the hospital are difficult to assess and were not analyzed in the current study. In our opinion, randomized trials may be difficult to conduct, due to concerns regarding heterogeneity of patients characteristics, limited number of patients, and ethical aspects of depriving patients of potentially beneficial treatment at a day-care unit.

Day-care HF units seem to be an efficient option for patients with recurrent hospitalizations due to HF, which may allow to improve outcomes and reduce insurer's costs.

ARTICLE INFORMATION

CONFLICT OF INTEREST None declared.

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REFERENCES

1 Saito M, Negishi K, Marwick TH. Meta-analysis of risks for short-term readmission in patients with heart failure. Am J Cardiol. 2016; 117: 626-632.

2 Maisel A, Xue Y, Shah K, et al. Increased 90-day mortality in patients with Acute Heart Failure with elevated copeptin secondary results from the Biomarkers in Acute Heart Failure (BACH) study. Circ Hear Fail. 2011; 4: 613-620.

3 Desai AS, Stevenson LW. Rehospitalization for heart failure: Predict or prevent? Circulation. 2012; 126: 501-506.

4 Ponikowski P, Voors AA, Anker SD, et al. 2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure: the Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC). Developed with the special contribution of the Heart Failure Association (HFA) of the ESC. Eur Heart J. 2016; 37: 2129-2200.

5 Freimark D, Arad M, Matetzky S, et al. An advanced chronic heart failure day care service: a 5 year single-center experience. Isr Med Assoc J. 2009; 11: 419-425.

6 Nessler J, Kozierkiewicz A, Gackowski A, et al. Coordinated heart failure care in Poland: towards optimal organisation of the health care system [in Polish]. Kardiol Pol. 2018; 76: 479-487.

7 Levy WC, Mozaffarian D, Linker DT, et al. The Seattle Heart Failure Model: prediction of survival in heart failure. Circulation. 2006; 113: 1424-1433.

8 Niedziela JT, Parma Z, Pawłowski T, et al. Secular trends in first-time hospitalization for heart failure with following one-year readmission and mortality rates in the 3.8 million adult population of Silesia, Poland between 2010 and 2016. The SILCARD database. Int J Cardiol. 2018; 271: 146-151.

9 Gąsior M, Pyka Ł, Gorol J, et al. COnteMporary Modalities In Treatment of Heart Failure: a report from the COMMIT-HF registry. Kardiol Pol. 2016; 74: 523-528.