Cost-of-Disease in Heart Failure in Turkey:A Delphi Panel Based Analysis of Direct Costs

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POSC 164

Abstract

OBJECTIVES: To determine the direct cost-of-disease in heart failure (HF) in Turkey from payer perspective.
METHODS: In this cost-of-disease study, direct costs of HF were determined based on epidemiological and clinical practice inputs provided by a three-round Delphi panel consisted of 11 experts in HF. Direct costs included cost items on outpatient management, inpatient management, non-pharmaceutical treatments and medications.
RESULTS: Based on the panel, 51.4%, 19.5% and 29.1% of the patients were estimated to have reduced, mid-range and preserved ejection fraction (HFrEF, HFmrEF and HFpEF), respectively. Total length of stays are calculated as 7.30, 3.27 and 3.66 days a year, respectively. Total annual direct cost per patient was €1,129, €546 and €639 in patients with HFrEF, HFmrEF and HFpEF, respectively. Average annual direct cost per patient –weighted due to the distribution of patients with regards to ejection fraction status– was €873. Non-pharmaceutical treatment was the major direct cost driver –42.1% in overall patients.
CONCLUSIONS: In conclusion, our findings confirm the substantial economic burden of HF in terms of direct costs. Presence of HFrEF seems to be associated with likelihood of cost increments related to direct expenses. Non-pharmaceutical treatment cost, which was almost completely related with inpatient management, was the key direct cost in the management of heart failure, regardless of the EF status of patients.

Introduction

- Heart failure (HF) is a progressive disease characterized by periodic exacerbations, frequent hospitalization and a poor long-term prognosis as well as high and increasing prevalence with a predominance in older age.[1-4]
- Accordingly, it is considered a major public health issue that imposes a substantial and growing epidemiologic and economic burden consistent with longer life expectancy and aging global population.[5-10]
- The global annual direct and indirect economic burden of HF is estimated to be $108 billion[10], attributing to approximately 1-2% of annual healthcare budget in developed countries. [8,10,11]
- Given the substantial cost impact of HF on healthcare systems, having a nationwide estimate of the costs attributed to HF is considered an increasingly important for health policy makers. [10,12,13]

Methods

Design

- In this cross-sectional cost-of-disease study annual direct costs of management of HF was determined based on epidemiological and clinical inputs provided by a Delphi panel consisted of 11 experts in HF.
- Direct medical costs included cost items on outpatient and inpatient management, medications and non-pharmaceutical treatments.

Epidemiological and clinical inputs

- Epidemiological and clinical inputs were retrieved via a standardized questionnaire that elicited items on epidemiological and clinical characteristics of the HF patients.

Data management and data analysis

- Direct medical costs were calculated based on cost items related to outpatient management (visits, consultations and tests), inpatient management (hospital stay, consultations and tests), medications and non-pharmaceutical treatments
- Direct cost inputs were obtained from drug price list of Turkish Medicines and Medical Devices Agency (TİTCK), and Declaration of Health Care Implementation (SUT) and its supplements, released by Social Security Institute (SGK) on March 2021.[14,15] Prices of medications were used as public prices, that is the Money out of SGK's pocket, which were calculated by using the drug prices published by TİTCK and institutional discounts published by SGK. Costs which are originally in Turkish Lira were converted to Euro (EUR/TL currency rate: 9.0073 on 15th March 2021).
- Cost model was based on the following equation:

  Cost (TL/year) = ∑ [(Frequency of usage of resource; amount per year) X (Unit price of the resource; TL) X (proportion of patient who use the resource; %)].

Results

- Average values of responses of panelists on HF epidemiology are given in Table 1.
- Cardiology outpatient clinics were estimated to be visited by 81.7% of HFrEF patients 3.0 times/year, which corresponds to an average 2.45 visit per year.
- When all patients are considered together (weighted by the proportions of patients among HFrEF, HFmrEF and HFpEF), the average annual number of visits at cardiology, internal medicine, cardiovascular surgery and pulmonology outpatient clinics are estimated to be 2.30, 0.48, 0.09 and 0.15.

Direct costs

- Average annual direct cost-of-disease per patient was calculated to be €873 from payer perspective. (Table 2).
- Non-pharmaceutical treatment was the major direct cost driver –42.1% in overall patients, and 43.2%, 37.1% and 41.5% in patients with HFrEF, HFmrEF and HFpEF, respectively–. Total annual national economic burden of HF is estimated to be around 990 million €, taking the estimated nationwide number of HF patients as 1.128.000 in 2021.

Table 1 Average values of responses of panelists on HF epidemiology.

	HFrEF	HFmrEF	HFpEF
HF patients, (%)	51.4%	19.5%	29.1%
Age			
<40 years	7.0%	5.2%	3.1%
40-49 years	13.5%	12.9%	7.8%
50-59 years	23.6%	27.5%	19.6%
60-69 years	32.3%	32.7%	32.7%
>=70 years	23.6%	21.6%	36.7%
Gender			
Male	63.4%	54.5%	42.5%
Female	36.6%	45.5%	57.5%
Underlying cause of HF			
Ischemic	64.9%	61.2%	35.9%
Nonischemic	35.1%	38.8%	64.1%
Concomitant diseases			
Hypertension	48.6%	57.3%	77.5%
Diabetes mellitus	32.5%	35.5%	45.0%
Coronary heart disease	63.0%	61.4%	44.3%
Chronic renal failure	31.4%	25.0%	37.5%
Atrial fibrillation	32.0%	25.0%	38.9%
Stroke	10.7%	7.1%	13.2%
COPD	16.8%	19.1%	22.3%
Hyperlipidemia	32.7%	41.8%	38.6%
Obesity	28.9%	33.2%	52.0%
NYHA class			
NYHA-I	15.2%	30.2%	19.2%
NYHA-II	49.1%	44.7%	45.9%
NYHA-III	27.7%	19.8%	27.1%
NYHA-IV	8.0%	5.3%	7.8%

COPD: *Chronic obstructive pulmonary disease;* ***HFmrEF:*** *mid-range ejection fraction;* ***HFpEF:*** *preserved ejection fraction;* ***HFrEF:*** *reduced ejection fraction;* ***NYHA:*** *New York Heart Association*

- Total annual direct cost-of-disease per patient was higher in patients with HFrEF (€1,129) than in those with HFmrEF (€546) or HFpEF (€639), while the non-pharmaceutical treatments were the major direct cost driver (43.2% [€488], 37.1% [€203] and 41.5% [€265], respectively) in each group (Table 2).

Table 2 Annual direct medical cost components related to management of HF.

DIRECT COST ITEMS	Annual costs (€/patient-year)			
	HFrEF	HFmrEF	HFpEF	All patients
Outpatient management	**€82**	**€72**	**€80**	**€80**
Visits	*€19*	*€16*	*€19*	*€19*
Consultation	*€3*	*€2*	*€3*	*€3*
Tests	*€60*	*€54*	*€58*	*€59*
Inpatient managament	**€204**	**€76**	**€88**	**€145**
Hospital stay	*€146*	*€44*	*€57*	*€101*
Consultation	*€2*	*€1*	*€2*	*€2*
Tests	*€55*	*€30*	*€29*	*€43*
Medications	**€355**	**€195**	**€205**	**€280**
Outpatient	*€251*	*€173*	*€181*	*€215*
Inpatient	*€104*	*€22*	*€25*	*€65*
Non-pharmaceutical* treatments	**€488**	**€203**	**€265**	**€367**
Palliative	*€133*	*€58*	*€56*	*€96*
Permanent/Continuous	*€355*	*€145*	*€209*	*€271*
TOTAL COST	**€1,129**	**€546**	**€639**	**€873**

**Non-pharmaceutical treatments include: Paracentesis, Thoracentesis, Oxygen treatment, Temporary pacemaker, Intraaortic balloon pump, ECMO, Electrical cardioversion, Cardiopulmonary resuscitation, Ultrafiltration, CPAP– BiPAP, Peritoneal dialysis, Hemodialysis, CRT-P, CRT-D, ICD, CABG, Coronary intervention, LVAD, Heart transplantation, Heart valve surgery, Mitraclip, TAVI, AF ablation, VT ablation, Physical therapy*

Conclusions

- In conclusion, our findings confirm the substantial economic burden of HF in terms of direct costs and indicate that the non-pharmaceutical cost is the key direct medical cost driver in the management of HF, regardless of the EF status of patients.
- Presence of HFrEF seems to be associated with likelihood of cost increments related to direct expenses.
- In this regard, our findings emphasize the role of adopting improved prevention, management, and surveillance strategies and delaying disease progression via implementation of guideline-based therapies in real-life management of HF to enable cost-savings for advanced disease management, hospitalization expenses.

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Supported by AstraZeneca

Presented at the Virtual ISPOR 2021, 30 November – 3 December

Acknowledgements: This study was supported by AstraZeneca. **Disclosure:** Çavuşoğlu Y, Altay H, Aras D, Çelik A, Ertaş FS, Kılıçaslan B, Nalbantgil S, Temizhan A, Ural D, Yıldırımtürk Ö and Yılmaz MB have received consulting honorarium from AstraZeneca. Dinç M and Özsoy A are employees of AstraZeneca. OÖ is an employee of Yorum Consulting who received fees from AstraZeneca in relation to this study.