Acceptance Code: EE424 Poster Session 5

Burden of disease estimation for heart failure in Colombia

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Introduction

Heart failure (HF) is a clinical syndrome characterized by an inadequate supply of oxygenated blood due to a structural or functional heart disorder that affects the ability of the ventricle to fill or eject blood.

HF have been classified according to left ventricular ejection fraction into HF with reduced ejection fraction (HFrEF ≤ 40%), HF with preserved ejection fraction (HFpEF ≥ 50%) and HF with moderately reduced ejection fraction (HFmrEF from 41 to 49%).

Heart failure constitutes an important economic and social burden for global health systems, due to the morbidity and low survival of patients with this pathological condition. Additionally, the influence of predisposing diseases or comorbidities (diabetes, obesity and hypertension) together with the aging of the general population, lead to an increase in the total number of people living with HF.

Objective

To estimate the burden of disease of heart failure (HF) in Colombia

Methods

- We initially performed an epidemiological estimation of cases and mortality based on local data and published literature. We quantified patients in each ejection fraction state.

Table 1. Main epidemiological parameters used in the model

Parameter	Value	Source
Prevalence	1.01%	Ciapponi, 2016
Mortality - 35-64 yo	28.3 per 100k	Sosa, 2011
Mortality - 65+ yo	633.5 per 100k	Sosa, 2011
% with reduced ejection fraction	50.60%	Muñoz-Mejia, 2018
% with preserved ejection fraction	34%	Muñoz-Mejia, 2018

- We then estimated DALY. For years lost to disability (YLD), we mapped disutility states to ejection fraction states. For years of life lost (YLL) to premature death, we estimated deaths by age and age group and their life expectancy according to Global Burden of Disease (GBD) study.

Table 2. Disability weights for each heart failure state.

Health state name	Disability Weight
Mild heart failure	0.041
Moderate heart failure	0.072
Severe heart failure	0.179

Table 3. Main direct costs considered in the model.

Parameter	Value USD	Source
Outpatient cost per year	988.8	Tamayo 2013
Hospitalizaed cost per event	2409.5	Tamayo 2013

- For costs, we considered direct and other costs. For the former, we estimated annual costs using base case with experts and local tariff manuals. We also used data from literature. For the later we considered productivity lost to disease morbidity, productivity lost to premature death and out of pocket expense. (2020, 1 USD = $3,693.36 COP)

Results

- We estimated a total of 490,831 total HF cases, with 27,437 deaths.

Table 4. Estimated cases and deaths based on the epidemiological information

	CASES		DEATHS	
HFpEF	166,638	34%	6,143	22%
HFmrEF	75,833	15%	2,852	10%
HFrEF	248,361	51%	18,442	67%
HFrEF -worsening	76,247	16%	13,308	49%
Total	490,831		27,437	
UI 2.5%	94,884		9,478	
UI 97.5%	1,349,697		73,346	

- We estimated a total cost of 1.2 billion USD for HF. 741 million USD were direct costs (61%), 467 million USD lost productivity (38.4%) and 7 million USD out of pocket expense (0.6%).

Table 6. Total direct and indirect costs estimated

	Direct	Productivity, morbidity	Productivity, mortality	Out of pocket	Total	PPPY
HFpEF	164,763,342	679,633	103,158,318	2,413,027	271,014,319	1,626
HFmrEF	74,979,813	309,284	47,890,682	1,098,110	124,277,890	1,639
HFrEF	537,229,668	5,349,960	309,722,716	3,596,428	855,898,772	3,446
Total	776,972,822	6,338,877	460,771,716	7,107,565	1,251,190,981	2,549

2020, 1 USD = $3,693.36 COP

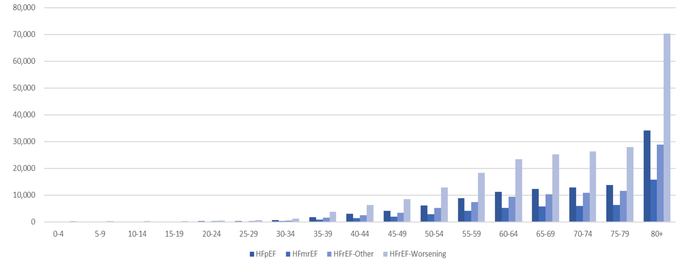
- Based on these data, we estimated 87,180 YLD and 453,228 YLL, for a total of 480,289 DALY. YLL constituted 97% of DALY.

Table 5. YLD, YLL and DALY

	CASES	%	YLDs	%	YLL	%	DALYs	%
HFpEF	166,638	34%	8,459	31%	101,469	22%	109,928	23%
HFmrEF	75,833	15%	3,849	14%	47,107	10%	50,956	11%
HFrEF	248,361	51%	14,753	55%	304,652	67%	319,405	67%
HFrEF -Worsening	76,247	16%	6,622	24%	219,828	49%	226,450	47%
Total	490,831		27,061		453,228		480,289	
UI 2.5%	94,884		5,941		221,752		265,965	
UI 97.5%	1,349,697		87,180		1,271,559		1,314,011	

We estimated that 56% of all DALY were attributed to males. When considering the Colombian population, HF would produce 953.5 DALY per 100,000. inhabitants.

Figure 1. DALY distribution by age group and type of heart failure.



Conclusions:

- Heart failure produces significant burden of disease in terms of DALY and costs in Colombia.
- Our estimation represents 4% of all DALY and 36% of cardiovascular disease DALY estimated for Colombia in the GBD study. Most of if was attributed to YLL. Direct costs were the main drivers of estimated costs, followed by lost productivity costs.
- HFrEF represents 67% of the total disease burden of heart failure.
- Worsening HFrEF accounts for 47% of the total HF load and 71% of HFrEF.
  - These patients have an important share in the burden of disease due to the increased risk of mortality.
- YLLs are the main contributor to the burden of disease in CF.

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