

# Total annual healthcare costs of heart failure between 2005 and 2014: a retrospective, population-based study in Sweden

Kurt Boman,<sup>1</sup> Krister Lindmark,<sup>2</sup> Jan Ståhlhammar,<sup>3</sup> Mona Olofsson,<sup>1</sup> Madlaina Costa-Scharplatz,<sup>4</sup> Ana Filipa Fonseca,<sup>5</sup> Sara Bruce Wirta,<sup>4</sup> Anna Castelo-Branco,<sup>6</sup> Michael Törnblom,<sup>6</sup> Gerhard Wikström<sup>7</sup>

<sup>1</sup>Research Unit, Medicine–Geriatric, Skellefteå County Hospital, Department of Public Health and Clinical Medicine, Umeå University, Umeå, Sweden; <sup>2</sup>Department of Public Health and Clinical Medicine and Heart Centre, Umeå University, Umeå, Sweden; <sup>3</sup>Department of Public Health and Caring Sciences, Family Medicine and Preventive Medicine, Uppsala University, Uppsala, Sweden; <sup>4</sup>Novartis Sweden AB, Stockholm, Sweden; <sup>5</sup>Wellmera AG, Basel, Switzerland; <sup>6</sup>IQVIA, Solna, Sweden; <sup>7</sup>Department for Medical Sciences, Uppsala University Hospital, Uppsala, Sweden

## Introduction

- Heart failure (HF) is a major public health challenge in developed countries owing to its symptoms, impact on quality of life and associated healthcare resource consumption, including a high risk of hospitalization.<sup>1,2</sup>
- In Sweden, HF is the most common cause of hospitalization in patients aged 65 years and older.<sup>3,4</sup>
  - Furthermore, available evidence on the economic burden of HF with preserved or reduced ejection fraction in Sweden suggests that the majority of HF resource use and costs are attributed to hospitalizations.<sup>5,6</sup>
- Changes in HF treatment patterns over the past decade, together with an ageing population with an increasing number of comorbidities, necessitate examination of healthcare resource use and costs associated with this complex and burdensome syndrome.

## Purpose

- This study aimed to build on existing evidence and to provide an update on trends in total healthcare costs from 2005 to 2014 among prevalent patients with HF in Sweden.

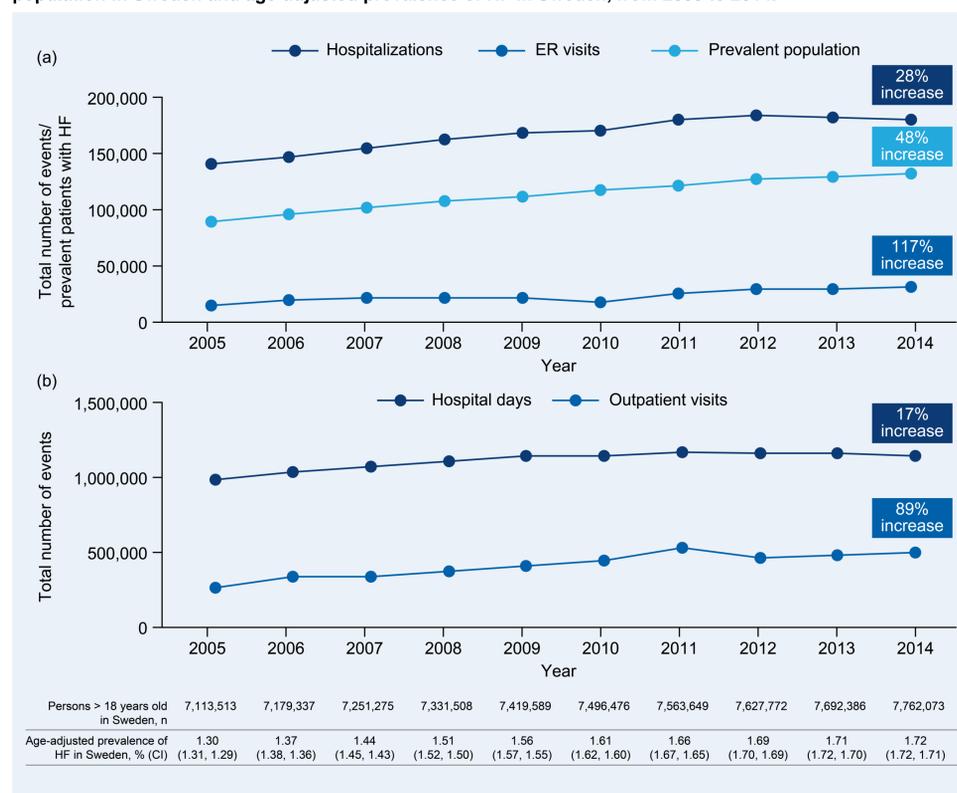
## Methods

- Adult patients (aged 18 years and older) with at least two diagnoses of HF during the identification period of 1 January 2005 to 31 December 2013 were identified using secondary care data from the National Patient Register (NPR).
  - International Classification of Diseases and Related Health Problems, 10th Revision (ICD-10) diagnosis codes of I50 (inclusive of all granular codes), I42.0, I42.6, I42.7, I42.9, I11.0, I13.0 or I13.2 as primary or secondary diagnoses were used to identify HF diagnoses.
- A look-back period from 1 January 1997 for inpatient care and 1 January 2001 for outpatient care to 31 December 2004 was used to identify prevalent patients with HF (i.e. those patients diagnosed with HF during the look-back period and who survived into the analysis period).
- The total numbers of hospitalizations, hospital days, emergency room (ER) visits and outpatient visits in secondary care were calculated per annum and further stratified by cardiovascular disease (CVD)- and HF-related resource use based on assigned ICD-10 diagnosis codes.
- Analyses of all-cause, CVD-related and HF-related costs associated with secondary care were performed based on diagnosis-related group codes and price lists, as determined by the National Board of Health and Welfare.<sup>7</sup>
- All costs were inflated to Swedish krona (SEK) 2015 values based on the Consumer Price Index<sup>8</sup> with the equivalent value in euros (€), based on the historical exchange rate in January 2015 (1 SEK = €0.105).

## Results

- The absolute number of prevalent patients with HF in Sweden increased 1.5-fold between 2005 and 2014, from 89,837 to 133,220, respectively (Figure 1).
  - This was accompanied by an increase in the overall population (from 7,113,513 to 7,762,073), representing a corresponding increase in age-adjusted prevalence from 1.30% to 1.72%.
- The total number of hospitalizations, hospital days, ER visits and outpatient visits in secondary care increased from 2005 to 2014, by between 1.2- and 2.2-fold (Figure 1).
  - The number of hospitalizations increased from 141,941 to 181,374 (difference: 39,433), representing a 28% increase.
  - The number of hospital days increased from 998,512 to 1,165,310 (difference: 166,798), representing a 17% increase.
    - The higher increase in the number of hospitalizations in comparison to the number of hospital days indicated that there was a decreased mean length of stay, of 4.23 days per hospitalization.
  - ER visits increased from 14,272 to 31,037 (difference: 16,765), representing a 117% increase.
  - Outpatient visits in secondary care increased from 262,771 to 497,230 (difference: 234,459), representing an 89% increase.

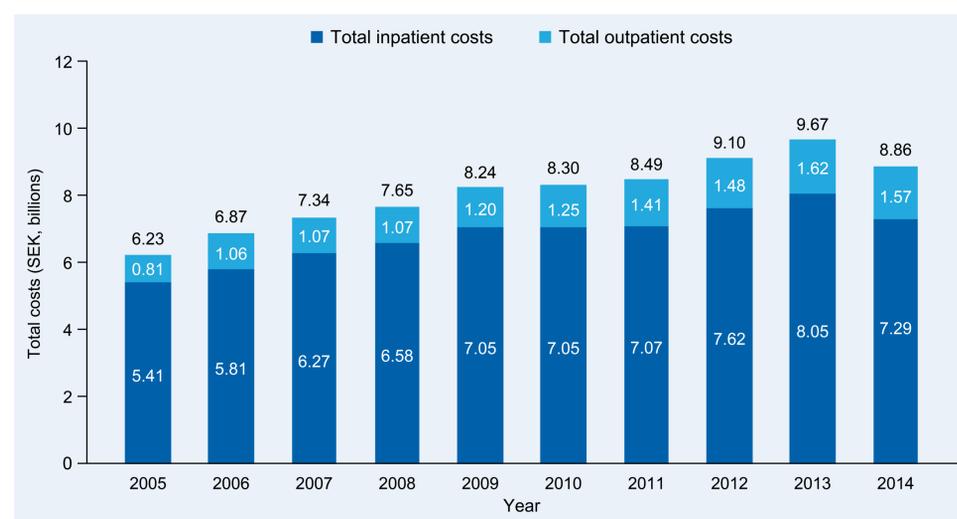
**Figure 1. Total number of (a) hospitalizations and ER visits and (b) hospital days and outpatient visits in relation to the absolute number of prevalent adult patients with HF extracted from the NPR, size of adult population in Sweden and age-adjusted prevalence of HF in Sweden, from 2005 to 2014.**



CI, confidence interval; ER, emergency room; HF, heart failure; NPR, National Patient Register.

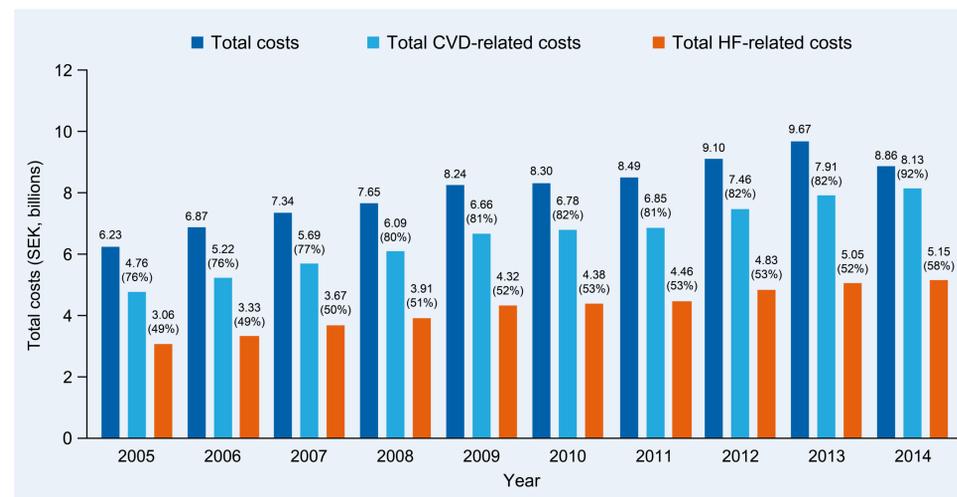
- The total annual costs associated with secondary care of prevalent patients with HF increased 1.6-fold from 6.24 billion SEK (€0.66 billion) in 2005 to 9.98 billion SEK (€1.05 billion) in 2014, mainly driven by a corresponding increase in overall resource use in inpatient care (52%) (Figure 2).
  - On average, inpatient and outpatient costs accounted for 84% and 16% of the total costs, respectively.
- On average, 81% of the total costs of secondary care were attributed to CVD-related costs; 64% of these were attributed to HF-related costs (Figure 3).
  - HF-related costs accounted for 52% of the total costs.

**Figure 2. Costs associated with secondary care of prevalent patients with HF from 2005 to 2014.**



Numbers above bars indicate total costs (sum of inpatient and outpatient costs). Total inpatient costs correspond to the costs associated with hospitalizations; total outpatient correspond to the costs associated with outpatient and ER visits. ER, emergency room; HF, heart failure; SEK, Swedish krona.

**Figure 3. Costs associated with secondary care of prevalent patients with HF from 2005 to 2014.**



CVD-related and HF-related costs are not mutually exclusive. The percentages shown represent the proportions of CVD-related and HF-related costs from the total costs. CVD, cardiovascular disease; HF, heart failure; SEK, Swedish krona.

## Conclusions

- Despite treatment advances in the underlying causes of HF over the last decade, the absolute number of patients with HF in Sweden continues to increase (partly due to an increase in overall size of the population and an increase in prevalence).
- Furthermore, the total cost of secondary care of prevalent patients with HF increased by more than 3 billion SEK over 10 years, a trend that was primarily driven by costs associated with inpatient care.
- Care for patients with HF represents an ever-increasing financial burden to the Swedish healthcare system. Improved patient care and interventions that reduce hospitalizations can help to alleviate the anticipated future burden to patients and the healthcare system.

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## Disclosures

K Boman, M Olofsson and J Ståhlhammar received reimbursement from Novartis via IQVIA for performing the study. K Lindmark has received lecture grants and consultant fees from Novartis. G Wikström has no conflicts of interest to declare; however, Uppsala University received research funding from Novartis for conducting this study. M Costa-Scharplatz and S Bruce Wirta are employees of Novartis Sweden AB, Sweden. AF Fonseca is an employee of Wellmera AG, Basel, Switzerland. A Castelo-Branco and M Törnblom are employees of IQVIA, Sweden. IQVIA was commissioned to conduct the study on behalf of Novartis Pharma AG and has ongoing consulting and research relationships with Novartis Pharma AG.

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