

The economic impact of patients with heart failure on the Lebanese healthcare system

Souzan Tatari^{1*}, Lama Soubra², Hani Tamim³, Kassem Akhras⁴ and Samer Kabbani⁵

¹Rafik Hariri University Hospital, Jnah, Beirut, Lebanon; ²Beirut Arab University, Tareek El Jadida, Beirut, Lebanon; ³American University of Beirut Medical Center, Hamra, Beirut, Lebanon; ⁴Novartis Pharma Services AG, Baniyas Road, Dubai, United Arab Emirates; ⁵Rafik Hariri University Hospital, Jnah, Beirut, Lebanon

Abstract

Aims This paper aimed to calculate the annual cost for heart failure (HF) patients in Lebanon.

Methods and results Heart failure care can reach up to \$31 billion annually in the USA. Data in Lebanon are lacking. Estimating it based on USA data is biased; hence, collecting data from all healthcare providers will reflect the actual cost in Lebanon. Data were collected from all healthcare providers on HF hospitalization during the year 2012. In addition, data from 600 outpatient visits were collected by medical students to estimate the cost for outpatient care. The total cost was calculated by adding up all hospitalization cost-plus outpatient-estimated cost. There were 72 000 individuals suffering from HF. The hospitalization care in Lebanon is largely delivered by the public sector (91% public vs 9% private). However, the outpatient care is largely paid cash by patients. The direct cost for HF hospitalizations paid by the public and the private sector was \$38 081 535. The average cost for each HF hospitalization was \$3769. The direct cost for outpatients care was estimated at \$65 592 000. The average cost for outpatient care was \$911 per patient per year. The annual total direct cost was calculated at \$103 673 535. The true cost was almost one third the extrapolated cost based on US statistics (\$103 673 535 vs 268 370 607, respectively).

Conclusions The annual total direct cost for HF patients in Lebanon in 2012 was \$103 673 535, which is much less than the extrapolated cost based on US statistics.

Keywords Healthcare costs; Heart failure; Lebanon

Received 20 February 2015; Revised 31 March 2015; Accepted 8 April 2015

*Correspondence to: Souzan Tatari, MD, Rafik Hariri University Hospital, Jnah, Beirut, Lebanon. Tel: +961 3 833 847, Fax: +961 1 843 834. Email: tatary_suzanna@hotmail.com

Introduction

The economic burden of heart failure (HF) continues to impose a staggering challenge to all segments of the healthcare system. This challenge is particularly prominent for the acute care facilities in the era of tightening budgets, diminishing reimbursements, quality of care mandates, government regulation and an aging population.¹ HF represents approximately 7% of the total burden of all cardiovascular diseases in the USA.² In 2012, HF costs in the USA exceeded \$31 billion.³ This includes the cost of healthcare services, medications and lost productivity.⁴ HF is the primary diagnosis in more than 1 million hospitalizations annually in the USA.^{4–10} The average length of stay is 6.3 days, and the 6 months readmission rate is roughly 50%.¹¹ The average cost for each HF hospitalization in the USA is \$12 000.¹²

Although a large number of studies were published on the cost of HF worldwide, data are still lacking in Lebanon, the Middle East and North Africa (MENA) region. The healthcare system in Lebanon is different from the USA system. The hospitalization care is provided by several sectors including public and private sectors. The public sector is the main contributor to the inpatient care. This includes the Ministry of Public Health (MOPH), the National Social Security Fund (NSSF), the Cooperative State Employees (COOP) and the military sectors.¹³ However, the outpatient care is paid cash by the majority of patients. The public sector does not provide outpatient care. Based on US data, we can extrapolate the annual cost of HF care in Lebanon. Nevertheless, this may not be an accurate estimate due to differences in healthcare cost, government regulations and patients' characteristics. The population in the USA is 313 million¹⁴ with a total direct

cost of \$21 billion for HF patients.³ The Lebanese population is 4.0 million; estimating the total direct cost of HF care in Lebanon based on the USA statistics will result in \$268 million annually. However, this extrapolated number is not an accurate figure. Thus, this study will calculate the actual annual direct cost of HF care in Lebanon by including inpatient and outpatient care.

Study design

Study design and population

It is a cross-sectional study that collected data from the inpatient and outpatient healthcare systems during the year of 2012. Data were collected after gaining approval from the Institutional Review Board at Rafik Hariri University Hospital (RHUH). Patients were included if they had primary or secondary diagnoses of HF with ICD 10 code I-50, were ≥ 18 years of age and signed written informed consent. Patients were excluded if they had unclear diagnosis of HF or refused to sign the consent form. There were two sets of data collected. The demographic data set was used to describe the characteristics of patient with HF and the economic data set was used to describe the annual outpatient and inpatient cost. The inpatient cost was retrieved from the private and the public sector. However, the outpatient cost was estimated by a survey performed in all regions of Lebanon in 2012.

Demographic data set

Data were collected using a registry at RHUH that enrolled all consecutive patients admitted with acute HF decompensation in the year 2012. RHUH is the largest public hospital with academic affiliation with four medical schools. RHUH services a large sector of the Lebanese population including public and private sectors. The registry data were used to describe the baseline demographic characteristics of patients with HF and the sub-distribution of cost for inpatients services as coronary care unit, pharmacy, laboratory, investigations, procedures and attending fees.

Economic data set

Inpatient heart failure cost

All patients hospitalized for HF in 2012 in Lebanon with an ICD 10 code I-50 were included in our study. Data were retrieved from all public and private sectors. The public sectors included the MOPH, NSSF, COOP and the military sectors. The private sectors included all private insurances.

Outpatient heart failure cost

The outpatient care is paid cash by patients. Thus, data were collected by a survey that was completed by medical students trained to carry out face-to-face interviews with eligible patients with the diagnosis of HF and their physicians. Data were taken from physicians' clinics and community pharmacies all over Lebanon. There were 85 students distributed in Beirut, Beirut suburbs, South Lebanon, North Lebanon, Mount Lebanon and Bekaa valley. Data included the cost of HF medications, HF-related investigation and HF-related clinic visits. In addition, information about age, gender, area of residence, frequency of physicians' visit, frequency of HF investigations and the number of hospitalizations per year were collected. The survey was used to estimate the average cost of outpatient HF care per patient per year. The total outpatient HF care was calculated by multiplying the average outpatient cost per patient by the total number of patients suffering from HF.

Statistical analysis

Data were entered into a Microsoft Excel sheet, which was transferred into the Statistical Package for Social Sciences (SPSS), version 21, which was then used for data management and analyses. Categorical variables were presented as number and percentage, whereas continuous variables were presented by mean and standard deviation or range. All data processing was carried out at the biostatistics unit at the American University of Beirut.

Results

The baseline characteristics of patients with HF admitted to RHUH during 2012 are shown in *Table 1*. The registry included 151 patients. The mean age was 65 years, the majority of patients were male (62%), the main cause of HF was ischaemic heart disease (71%), the prevalence of diabetes was 40%, the average length of stay was 11 days, and the 6 months readmission rate was 57.5% (*Table 1*).

Inpatients healthcare distribution

The healthcare system in Lebanon is primarily provided by the public sector, which contributes to 91% of the total healthcare budget. The private sector is provided by small private insurances that contribute only 9% of the healthcare budget. The main contributors to the public sectors are the MOPH and NSSF, which constituted 68% of the public healthcare system. Several other governmental healthcare funds contribute 32% of the remaining budget (*Figure 1*).

Table 1. Basic characteristics for patients with heart failure from a registry conducted at Rafik Hariri University Hospital during 2012 (N = 151)

Characteristics	Heart failure patients (N = 151)
Age, years (min–max)	65 (28–93)
Gender, % male	62
Coronary artery disease %	71
Diabetes mellitus %	40
Hypertension %	66
Atrial fibrillation %	32
Valvular heart disease %	21
Chronic kidney disease (GFR < 60 mL/min/1.73 m ²) %	15
Average systolic blood pressure, mmHg (min–max)	131 (78–220)
Average heart rate, BPM (min–max)	86 (50–160)
Length of stay, days (min–max)	11 (2–62)
Readmission rate at 6 months %	57.5

Heart failure hospitalizations

The prevalence of HF in Lebanon in 2012 was 1.8% (72 000 patients). The total number of patients hospitalized for HF during 2012 was 11 324 patients (16% of total HF patients). The total number hospitalized at the expense of MOPH was 3652 patients, which constitutes 36% of the total HF hospitalizations in Lebanon. The remaining patients were hospitalized at the expense of NSSF (2831 patients), COOP (1472 patients), army (1472 patients) and mutual funds (453 patients). The total number of HF hospitalizations at the expense of the private sector was 1444 patients (*Table 2*).

Inpatient heart failure cost

The cost for HF hospitalizations paid by the public sector was \$34 657 479, which was subdivided into \$13 862 992 by

Table 2. The cost for inpatients heart failure care and the number of heart failure hospitalizations in 2012 at the expense of each Lebanese healthcare system category

Healthcare system categories	Number of heart failure hospitalizations	Cost (\$)
MOH	3652	13 862 992
NSSF	2831	9 704 094
COOP	1472	4 852 047
Army	1472	4 852 047
Private sector	1444	3 424 056
Mutual funds	453	1 386 299
Total	11 324	38 081 535

MOH, Ministry of Public Health; NSSF, National Social Security Funds; COOP, Cooperative State Employees.

MOPH, \$9 704 094 by NSSF and \$11 090 393 by other public sectors. The cost paid by the private sector was \$3 424 056. The total cost for hospitalization paid by the private and the public sectors in 2012 was \$38 081 535 (*Table 2*).

The average cost of each hospitalization per patient was \$3769. The distribution of costs among inpatients were 49% for the coronary care unit, 14% for the laboratory investigations, 12% for the radiology, 10% for the pharmacy, 7% for the attending fees, 5% for the procedures and 3% for others (*Figure 2*).

Outpatient heart failure cost

Data were collected for 600 patients and analyzed for 519 patients. Data for 81 patients were excluded due to inaccurate diagnosis of HF or incomplete information. The average cost for outpatient care was \$911 per patient per year. The total cost for outpatient HF care in 2012 was \$65 592 000. The total cost was subdivided into medication cost (72%), investigations (15%) and clinic visit (13%). Patients tend to see their physicians 2.6 times per year and perform twice per year investigations for HF care (*Table 3*).

Figure 1 Fund distribution for the Lebanese healthcare system. MOH and NSSF constitute the majority of healthcare expenditure in Lebanon where the private sector constitutes only 9% of the whole expenditure. COOP, Cooperative State Employees; MOH, Ministry of Public Health; NSSF, National Social Security Funds.

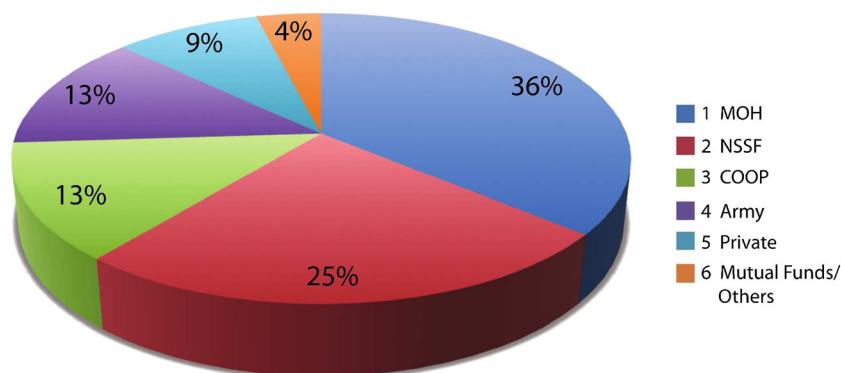


Figure 2 Distribution of heart failure cost for inpatients by different categories. Almost about half of the cost of hospitalizations was spent in the Coronary Care Unit. The others were distributed on laboratory fees, imaging, drugs, procedures and attending fees.

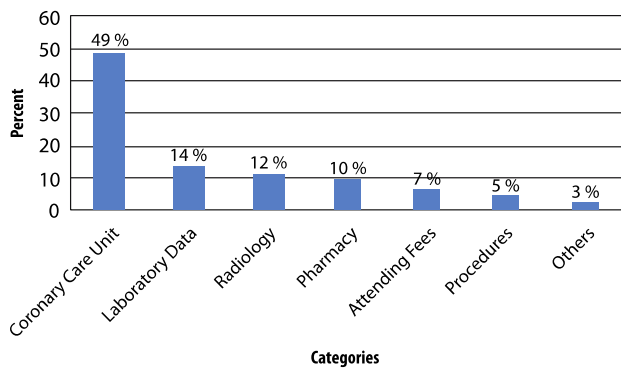


Table 3. The average cost of heart failure related medications, investigations and outpatient clinic visits per year

Variables	Cost in \$ per year (% of the total cost)
HF medications	655 (72)
HF-related investigations	140 (15)
Clinic visits	116 (13)
Total outpatient cost	911 (100)

Total cost for heart failure care

The total direct cost for HF care in 2012 including inpatient and outpatient care was \$103 673 535. The total calculated cost was almost one third of the extrapolated cost based on USA statistics (\$103 673 535 vs \$268 370 607, respectively) (Table 4).

Discussion

Lebanon is located in the Middle East where data on HF in the MENA region are scarce. Data mainly originate from single-center studies, with limited sample size. A retrospective study of 155 non-valvular HF patients in Egypt¹⁵ and a

registry of 1164 patients with HF from Oman¹⁶ reported only demographic information about patients with HF. There were no economic data reported. The Heart Function Assessment Registry Trial in Saudi Arabia (HEARTS) was the first multi-center registry in Saudi Arabia. This study provided a reasonable profile of the clinical care of consecutive patients managed in major tertiary care hospitals in three of the five main geographic areas in Kingdom of Saudi Arabia.¹⁷ However, cost and economic data were not reported. Thus, our paper is the first of its kind to report economic data on patients with HF in our region.

The demographic characteristics of our patients with HF were comparable with the USA patients. The average age of HF patients in Lebanon was 65 years, which is comparable with the USA patients. The cause of HF is mainly ischaemic in nature similar to the USA patients. Some of the risk factors for coronary artery disease are comparable. However, the prevalence of diabetes in patients with HF in the USA is 19%¹⁸ in comparison with 40% in Lebanon. The high incidence of diabetes in our region was also noted in previous studies done in this region. The prevalence of diabetes in Saudi Arabia in patients with acute HF was 60.7% in the HEARTS study.¹⁷

Hospitalization for HF in Lebanon was noted to be at 16%, which was comparable with US hospitalization (16%). However, extrapolating economic data for our region based on the USA data is not an accurate method. The average cost of hospitalization for HF patients based on the USA data is \$12 000. However, the actual average cost in Lebanon was calculated at \$3769. Even though the average length of stay in Lebanon was 11 days as compared with 6.3 days in the USA, still our cost remains lower. This is related to a much lower cost of hospitalization care and investigations. The main cause of extended length of stay in Lebanon is probably related to administrative issues. The majority of investigational work on each patient requires a pre-approval from a third-party payer, which can take up to 2 days. However, investigations in the USA are carried out ad-hoc without the need for prior approvals.

The total cost for HF in the USA in 2012 was \$31 billion for a population of 313 million individuals.¹⁸ The direct cost in the USA is \$21 billion. Extrapolating these numbers to the 4.0 million Lebanese individuals will result in a total direct cost of \$268 million for the HF care in Lebanon. However, our study showed that the total direct cost was calculated

Table 4. Extrapolated numbers based on USA statistics versus actual numbers based on the study conducted in Lebanon in 2012. There was a difference between the extrapolated and the actual numbers

	Extrapolated numbers	Actual numbers
Number of HF patients	77 000	72 000
Number of HF hospitalizations/year	12 780	11 324
Average cost per hospitalization (\$)	12 000	3769
Total cost per year (\$)	268 370 607	103 673 535

at \$104 million, which is almost one third of the extrapolated number. This reflects that extrapolation of data is not an accurate method to estimate the cost and demographic information on patients in our region. Each region has its own demographic and economic characteristics. Studies carried out in each region are essential for governmental planning. This will help to understand the real economic burden of each disease. Local and regional studies are essential to improve care and cut cost on the healthcare economy in our region.

Limitations

Like any other observational study, our study is subject to a number of limitations. We mainly relied for the inpatient cost on claims paid for by the government or third-party payers. This is subject to coding errors and other administrative or clinical errors. Moreover, we had to estimate the outpatient cost based on a survey of 600 patients with HF. This may not represent the total actual outpatient cost. However, the distribution of the sample size by region was well represented to the distribution of the Lebanese population. In addition, this is the best estimate for outpatient care because there are no data collected by the government on the outpatient services, as it is cash paid by patients. We also assumed that the patient characteristics at RHUH are similar to profiles of patients in other centers. However, RHUH is the largest university medical center that admits all categories of patients from the public and private sectors. Thus, the patient population may be as close as possible to the true Lebanese population. Moreover, the comparison of cost in the USA has multiple limitations due to the differences of healthcare systems. Despite these limitations, we believe that this study adds significantly needed information to the literature given the rapidly rising healthcare cost in the region and the scarcity of data in the MENA region.

References

1. Seick S. The economics and reimbursement of Congestive Heart Failure. In Peacock WF, ed. *Short Stay Management of Acute Heart Failure*. New York, USA: Humana Press; 2012, p9–32.
2. Seick S. American Heart Association. Cardiovascular Disease Statistics. Dallas: AHA; 2010. Available at <http://www.americanheart.org/presenter.jhtml?Identifier=4478> (1 December 2010).
3. Heidenreich PA, Albert NM, Allen LA, Bluemke DA, Butler J, Fonarow GC, Ikonomidis JS, Khavjon O, Konstam MA, Maddox TM, Nichol G, Pham M, Pina IL, Trogon JG. Forecasting the impact of heart failure in the United States: a policy statement from the American Heart Association. *Circ Heart Fail* 2013;**6**:606–619.
4. Yancy CW, Jessup M, Bozkurt B, Butler J, Casey DE, Drazner MH, Fonarow GC, Geraci SA, Horwich T, Januzzi JL, Johnson MR, Kasper EK, Levy WC, Masoudi FA, McBride PE, McMurray JJ, Mitchell JE, Peterson PN, Riegel B, Sam F, Stevenson LW, Tang W, Tsai EJ, Wilkoff BL. 2013 ACCF/AHA guideline for the management of heart failure. A report of the American College of Cardiology Foundation/American Heart Association. Task force on practice guidelines. *J Am Coll Cardiol* 2013;**62**: e147–e239.
5. Desai AS, Stevenson LW. Rehospitalization for heart failure: predict or prevent? *Circulation* 2012;**126**:501–506.
6. Joseph SM, Cedars AM, Ewald GA, Geltman EM, Mann DL. Acute decompensated heart failure. Contemporary medical management. *Text Heart Inst J* 2009;**3616**:510–520.
7. Hall MJ, Levant S, DeFrances CJ. Hospitalization for congestive heart failure: United States, 2000–2010. NCHS Data Brief.No.108.October 2012.
8. Kim SM, Han HR. Evidence-based strategies to reduce readmission in patients with heart failure. *J Nurse Pract* 2013;**9**:224–232.
9. Ambrosy AP, Fonarow GC, Butler J, Chioncel O, Greene SJ, Vaduganathan M, Nodari S, Lam CS, Sato N, Shah AN, Gheorghide M. The global health and economic burden of hospitalizations for heart failure. Lessons learned from hospitalized heart failure registries. *J Am Coll Cardiol* 2014;**63**:1123–1133.

Conclusion

The actual direct total cost of HF care in Lebanon is \$104 million, which is much less than the extrapolated data from the USA statistics. Thus, estimating the cost of healthcare in our region should be based on studies in each country and not extrapolated from US data.

Acknowledgements

We thank our research coordinators, pharmacy, medical students and secretaries for their help.

Funding

This study was supported by a grant from Novartis Pharma Services AG (grant number not applicable).

Conflict of Interest

None declared.

Abbreviations

COOP: Cooperative State Employees

HF: Heart failure

ICD: International Classification of Diseases

MOPH: Ministry of Public Health

NSSF: National Social Security Funds

RHUH: Rafik Hariri University Hospital

USA: United States of America

10. Butler J. Primary prevention of heart failure. *ISRN Cardiology* 2012. Available at <http://dx.doi.org/10.5402/2012/982417>.
11. Bueno H, Ross JS, Wang Y, Chen J, Vidan MT, Normand ST, Curtis JP, Drye EE, Lichtman JH, Keenan PS, Kosiborod M, Krumholz H. Trends in length of stay and short-term outcomes among Medicare patients hospitalized for heart failure, 1993–2006. *JAMA* 2010;**303**:2141–2147.
12. Steiner C, Barrett M, Weiss A. Healthcare and Utilization project (HCUP) projections. Cardiovascular/Cerebrovascular Conditions and Procedures 2001 to 2012. HCUP Projections Report #2012- 02. Online July 10, 2012. U.S. Agency for healthcare research and quality. Available at <http://www.hcup-us.ahrq.gov/reports/projection/2012-02>.
13. Lebanon Knowledge Development Gateway. Online available at <http://Lkdg.org/node/4948>.
14. Schlesinger R. *U.S. Population 2012: Nearly 313 Million People News and World Report*. Dec 2011. Available at <http://www.usnews.com/opinion/blogs/robert-schlesinger/2011/12/30/us-population-2012-nearly-313-million-people>.
15. Ibrahim BS. The frequency of systolic versus diastolic heart failure in an Egyptian Cohort. *Eur J Heart Fail* 2003;**5**:41–45.
16. Agarwal AK, Venugopalan P, de Bono D. Prevalence and etiology of heart failure in an Arab population. *Eur J Heart Fail* 2001;**3**:301–305.
17. AlHabib KF, Elasar AA, AlBackr H, AlFaleh H, Hersi A, AlShaer F, Kashour T, AlNemer K, Hussein GA, Mimish L. Design and preliminary results of the heart function assessment registry trial in Saudi Arabia (HEARTS) in patients with acute and chronic heart failure. *Eur J Heart Fail* 2011;**13**:1178–1184.
18. Kannel WB. Incidence and epidemiology of heart failure. *Heart Fail Rev* 2000;**5**:167–173.