

RESEARCH ARTICLE

**Direct cost of Hospital Management of heart failure at the intensive Cardiological care unit of Befelatanana University Hospital, Antananarivo**

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**ABSTRACT**

**Introduction:** Heart failure is a serious and costly condition. Health expenditures related to heart failure continue to increase. In Madagascar, the failure of the social and health insurance system prompted us to estimate these expenses in order to assess the impact on patients' financial status. The objective of our study was to evaluate the direct costs of managing heart failure.

**Methodology:** This was a cross-sectional descriptive study in the Intensive Cardiological Care Unit of the Befelatanana Teaching Hospital from February to April 2019. All patients admitted for heart failure who responded to the questionnaires were included. Patients with incomplete records or who have filed out against medical decision have been excluded.

**Results:** Thirty cases were selected. Mean age was 52.33 +/- 17.11 years with a gender-ratio was 1. Average cost of hospitalization was 1, 536, 066,66 Ariary for an average hospital stay of 14.96 +/- 12.28 days. This cost represented 9.8 times the Malagasy Guaranteed Minimum Interprofessional Salary. The breakdown of this cost is as follows: pharmaceutical costs and consumables: 39.06%, fees for acts and additional examinations: 31.27%; living expenses: 20.15%; expenses for accompanying persons: 5.58%. More than 80% were the responsibility of accompanying persons and/or families.

**Conclusion:** Heart failure is a condition that is very expensive in Madagascar. It is essential to have a good health insurance system and focus on prevention.

**KEYWORDS**

cost, hospitalization, heart failure, Madagascar.

**History**

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**INTRODUCTION**

Heart failure (HF) is a serious and costly condition because of many hospitalizations related to decompensations [1-2]. Health expenditures related to heart failure continue to increase, weighing more than the top four causes of cancer combined (lung, breast, intestines and prostate cancers) [3]. The failure of the social and health insurance system in Madagascar prompted us to estimate these expenses in order to assess the impact on patients' financial status. Thus, we conducted this study to evaluate the direct costs of management of heart failure in the Intensive Cardiological Care Unit (ICCU).

**METHODOLOGY**

It was a cross-sectional descriptive study in the ICCU of Befelatanana University Teaching Hospital at Antananarivo Madagascar from February to April 2019. We included hospitalized heart failure patients who meet the HF definition according to the latest guidelines of the European Society of Cardiology in 2016 [4]. We evaluated age, gender, profession, length of stay, clinical

picture of HF (left, right, global HF), etiology (based on clinical, biological, electrical and ultrasound data), housing category and care. To compare costs, we used the malagasy Guaranteed Minimum Interprofessional Salary (GMIS) in 2017 (155, 523, 00 Ariary) [5]. Exchange rate for Euro of April 20, 2019 was arbitrarily used: 1 Euro worth 4, 082, 59 Ariary. The exact test of Fischer was used for the comparison of proportions. The cost data were collected using the bottom-up method.

**RESULTS**

In total, 30 cases were included. The average age was 52.33 years (range 21 to 83 years). The gender-ratio was 1. The average cost of hospitalization was 1, 536, 066, 66 Ariary for an average length of stay (ALS) of 14.96 days (range 03 to 45 days). This cost represented 987.6% of the malagasy GMIS. Pharmaceuticals and consumables costs, and those of supplementary examinations and procedures accounted respectively for 39.06% and 31.27% of the overall average cost (Table I). Among the types of HF, the cost of managing the global HF was the highest (Table II). Table III shows that ischemic heart disease and valvulopathy were the most costly causes of HF. More than 80% of the costs were at the personal expense of accompanying persons and/or families (Table IV).

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**Table 1:** Hospitalization cost and its components in Ariary and Euros (%).

	Median cost in Ariary	Median cost in Euros	Percentage (%)	Ratio cost/ GMIS (%)
Pharmaceutical fees and consumables	600, 000,00 (258, 100,00 – 1, 200, 000,00)	144	39,06	385,8
Complementary examinations and acts	480, 400,00 (154, 400,00 - 692, 400,00)	115,29	31,27	308,9
Cost of dispense of accompanying persons	87, 500,00 (40, 000,00 - 200, 000,00)	21	5,70	56,2
Stay fees	294, 666,66 (0 - 405, 000,00)	70,71	19,19	940,4
Transport costs	73, 500,00 (14, 000,00-250, 000,00)	18,00	4,78	47,2
Overall average cost	1, 536, 066,66 (40, 000,00 – 1, 500, 000,00)	309,28	100	987,6

GMIS: Guaranteed Minimum Interprofessional Salary

**Table 2:** Comparison between global HF, left HF, and right HF.

	Global HF	Left HF	Right HF
Number	19	10	1
Mean age (years)	52,45 +/- 17,45	51,10 +/- 17,88	63
ALS (days)	14,42 +/- 13,14	16,80 +/- 11,38	7
Overall average cost (Ariary)	2, 619, 816,05	2 127 046,60	386, 460, 00

ALS: average length of stay

HF: Heart Failure

**Table 3:** Overall cost according to etiology.

Etiology	Average cost (Ariary)
Hypertensive and ischemic heart disease	385, 019, 70
Ischemic heart disease	1, 744, 113, 00
Valvular heart disease	1, 735, 452, 50
Peripartum heart disease	852, 566, 66
Hypertensive heart disease	1, 002, 650, 00
Ethylic heart disease	208, 600, 00
Chronic pulmonary heart	386, 460, 00

**Table 4:** Who supports the hospitalization costs.

	Number (n)	Proportion (%)
Accompanying persons and families	25	83,33
Health insurance of a company	2	6,67
State	2	6,67
Hiring company	1	3,33
Total	30	100

**Table 5:** Occupational Sectors of Cardiac Patients.

Professional sectors	Number (n)	Percentage (%)
Private sectors	12	40
Informal sectors	9	30
Other	6	20
officials	3	10
Total	30	100

## DISCUSSION

The mean age of our patients was 52.33 +/- 17.11 years. Other African studies reported cardiac patients aged 55 to 60 years [6-8]. However, in developed countries the mean age of heart failure patients is up to 77 years old [3] because of the advanced management of cardiovascular risk factors in advanced countries to prevent the occurrence of cardiovascular complications including heart failure.

In our study, the ALS was 14.96 +/- 12.28 days. In Togo, however, it was 7.20 days in 2012 [8]. Nigerian [7] and Moroccan [6] series showed an ALS of 11.95 days and 12.1 days respectively. In France, the average length of stay in ICCU is 4.2 days [3]. The explanation would be multifactorial. First, the failure of the technical platform, such as angiocoronarography for ischemic heart disease; promotes the occurrence of many complications. Then, treatment of this type of heart disease requires effective

anticoagulation for 7 to 10 days while performing close monitoring of the troponinemia. Finally, the financial problem of the majority of the patients delayed the support because the hospitalization costs were in 80% of the cases supported by families and accompanying persons in our series.

The cost of paraclinical examinations and procedures was second only to pharmaceutical costs. This cost is explained by the fact that the exams are paid by the families by their own pocket.

In our study, the most expensive pharmaceutical costs were reaching up to 41.02% of the overall cost or 3.8 times the GMIS. Similar results were reported in Togo [8]. The cost of management of non-revascularized ischemic heart disease and non-operated valvulopathy were the most expensive. In the absence of a suitable structure for the radical care of these types of heart disease, this cost may still weigh because of complications. The overall cost of hospital management of a heart failure outbreak was up

**Table 6** : Costs comparison.

	Pathology	Average cost	Report with GMIS	ALS (days)
Ours study	HF (medical therapy)	1, 536, 066,66 Ariary (309,28 Euros)	9,8 times	14,9
Baragou et al Togo, 2012	HF (medical therapy)	223, 559,45 FCFA (340,81 Euros)	11,4 times	7,20

HF : heart failure

FCFA : Franc Communauté Financière en Afrique

to 987.6% malagasy GMIS. This cost was considered expensive for the majority of accompanying persons and families. The overall cost of HF management in Madagascar is much lower than in Togo in 2012 (Table VI). The weakness of the size of our sample could explain this difference. Global HF support was the most expensive. The frequency of complications of this type of HF during hospitalization (such as rhythm disorders, cardiogenic shock) increases the cost of its management. However, in 2015, the health sector accounted for only about 8% of the malagasy state's budget, still far from the 15% target set in the Abuja Declaration [9]. Since the management of HF outbreaks is very expensive for Malagasy people, a stronger investment in the health sector would be very necessary.

## CONCLUSION

HF are very expensive to manage. The majority of the expenses were the responsibility of the accompanying persons and families. Cost was more expensive in ischemic and valvular heart disease. The establishment of social security system could alleviate this heavy burden of care. Investments must be made to introduce prevention systems, including cardiovascular risk factors.

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