Medical resource use and expenditure in patients with chronic heart failure: a population-based analysis of 88,195 patients

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ABSTRACT

BACKGROUND: Heart failure (HF) is one of the diseases with more health care expenditure. However, little is known on the cost of heart failure at a population level. Hence, our aim was to study the population-level distribution and predictors of healthcare expenditure in patients with HF.

METHODS AND RESULTS: Population-based longitudinal study including all prevalent HF cases in Catalonia (Spain) on December 31st, 2012 (n=88,195). We evaluated 1-year healthcare resource use and expenditure using the Health Department (Catsalut) surveillance system that collects detailed information on healthcare usage for the entire population. Mean age was 77.4 (12) years, 55% were women. One-year mortality rate was 14%. All-cause emergency department visit and unplanned hospitalization were required at least once in 53.4% and 30.8% of patients, respectively. During 2013, a total of € 536.2 million were spent in the care of HF patients (7.1% of the total healthcare budget). The main source of expenditure was hospitalization (39% of total) whereas out-patient care represented 20% of the total expenditure. In the general population, out-patient care and hospitalization were the main expenses. In multivariate analysis, younger age, higher presence of comorbidities, a recent HF- or all-cause hospitalization were independently associated with higher healthcare expenditure.

CONCLUSIONS: In Catalonia, a large portion of the annual healthcare budget is devoted to HF patients. Unplanned hospitalization represents the main source of healthcare-related expenditure. The knowledge of how expenditure is distributed in a non-selected HF population might allow health providers to plan the distribution of resources in patients with HF.

Keywords: heart failure; cost; resource utilization; hospitalization; expenditure.

INTRODUCTION

Heart failure (HF) is already a global pandemic and more than 1 million hospitalizations annually are due to HF in the United States and Europe (1). It is estimated that 1-2% of healthcare budget in Western countries is spent in HF (2), and HF is expected to increase both in prevalence and in health-related costs (3,4).

Previous studies have shown that hospitalization accounts for two thirds of the total HF-related expenditure (5–9). However, these studies included patients with reduced ejection fraction (6,10–12), with acute heart failure (9,12,13) or followed-up in cardiology or heart failure clinics (10,12,14). Hence, these studies do not reflect the whole spectrum of HF patients. Moreover, most of the studies calculated the expenditure specifically associated with HF care. Patients with HF have multiple comorbidities, and it might be impossible to differentiate expenses specifically attributed to HF when a concomitant decompensation of comorbidity is also present. Therefore, the knowledge of how total healthcare expenditure is distributed in patients with HF (including HF-related care, and the care of other comorbidities) is of great importance. In addition, HF expenditure is not evenly distributed across the spectrum of HF patients, with few of them accounting for the majority of costs (12). Although some studies have analysed factors that affect expenditure in HF patients, these studies focused on patients after a HF hospitalization (15,16) or with certain comorbidities (anaemia and chronic kidney disease) (13,17). Less is known on the effect of age or comorbidities on expenditure in the general HF population (18). The identification of factors associated with an increased expenditure in a non-selected HF population might help health providers and health funding agencies to plan the distribution of resources in patients with HF.

Hence, the aim of this study was to describe the population-level distribution of healthcare resource use and expenditure in patients with HF, and identify the key independent clinical predictors associated with an increased healthcare expenditure, in a large sample of non-selected chronic heart failure patients.

METHODS

DATA SOURCE AND STUDY DESIGN

The study was performed in the region of Catalonia (Northeastern Spain). In 2012, Catalonia had a total population of 7,553,650 inhabitants with a density of 232.8 inhabitants/Km2. Local Health Department (Catsalut) provides public universal healthcare coverage to all residents. Since 2011, the CatSalut surveillance system collects detailed information on healthcare usage for the entire population of Catalonia (19). It includes information from the Minimum Basic Dataset for Healthcare Units registry which includes hospitalization, primary care, skilled nursing facilities and mental health network, information on pharmacy prescription and expenditure, and a registry on the billing record, which includes outpatient visits with specialists, emergency department visits, non-urgent medical transportation, ambulatory rehabilitation, domiciliary oxygen therapy and dialysis. Among the different variables collected, one variable indicates whether the hospital admission or visits are scheduled or unplanned. This information is filled in by the healthcare provider.

The registry has an automated data validation system that checks the consistency of the data and identifies potential errors. Moreover, as this information is used for provider payment purposes, external audits are performed periodically to ensure the quality and reliability of the data. These externals audits are performed whenever a suspicious deviation is detected or, if none are detected, every 3 or 5 years.

Episodes of inpatient care attended in private health centres could not be captured because private hospitals do not use the Personal Health Identification Number and therefore this information was not available for analysis. Nevertheless, use of private hospital is scarce for HF patients and the majority of unplanned HF hospitalizations are done in public hospitals: of 978.024 all-cause hospitalizations performed in Catalonia in 2013, 770,553 were done in public hospitals (79% of the total) and the rest in private hospitals. In 2013, there were 19,278 HF hospitalizations: 18,900 in public hospitals and only 378 (2%) in private hospitals.

The study used retrospective de-identified data from administrative databases and, therefore, the need for informed consent was waived.

STUDY POPULATION

All Catalonia residents with a diagnosis of HF on December 31st 2012 were included in the analysis. Patients younger than 15 years were excluded from the analysis. This yielded a final study population of 88,195 prevalent HF cases 15 years or older. HF diagnosis was defined according to the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) (see Appendix 1 for Codes). HF hospitalizations were defined according to the AHRQ Prevention on Quality Indicators (PQI 08 Admission Heart Failure Rate). We included all patients irrespective of the setting in which heart failure diagnosis was made and patients were divided in 3 groups: patients with a HF diagnosis made at the primary care setting and who had never been admitted due to HF, patients with a remote (>1 year, i.e. before December 31st 2011) and with a recent (<1 year, between January 1st- December 31st 2012) HF admission.

ASSESSMENT OF HEALTHCARE EXPENDITURE

The primary outcome variable of the study was 1-year healthcare resource use and expenditure. In Catalonia, allocation of expenditure is direct in most cases because each billing invoice is attributed to each patient through the Personal Health Identification Number. This is also true for pharmacy expenditure. Expenditure is calculated indirectly for primary care (standard price is calculated per visit and weighted by professional [physician or nurse] and site of assistance), hospital care (weighted by Diagnosis Related Groups [DRGs]), and skilled nursing facilities and mental healthcare, in which expense is calculated according to length of stay. Appendix 2 shows the average price by activity in Catalonia. These prices are the rates that CatSalut pays its suppliers and are published annually in the Official Gazette of the Catalonia

Government. The CatSalut budget for 2013 was 8,085 million (M) of euros, of which €7,885 M (97.5%) were devoted to healthcare services. Healthcare expenditure was calculated as the expenditure in euro per person per year. This methodology allows to calculate the total healthcare expenditure in patients with HF (including HF-related care, and the care of other comorbidities), rather than the expenditure specifically associated with HF care, allowing for a comprehensive analysis of the healthcare expenditures in this group of complex patients. To account for shorter follow-up periods due to deaths, time at risk was calculated in days from December 31st 2012 to the date of death (or 365 days otherwise) and transformed to years. Thus, the unit of analysis is not the patient but the patient/year. Age and the presence of comorbidities are associated with worse outcomes and increased resource use (14,17). Therefore, we analysed expenditure according to different age groups, number of comorbidities and the setting in which heart failure was diagnosed.

ASSESSMENT OF PREDICTORS OF INCREASED EXPENDITURE

We also evaluated the independent predictors associated with a yearly expenditure equal to or above the 85th percentile of the distribution in the study population. This analysis was carried out exclusively in patients who survived the whole study period (n=75,585). Predictors assessed were age, sex, comorbidities included in the Charlson Index (20), previous health care utilization and other diseases (atrial fibrillation, anaemia, valve heart disease, depression, cardiac conduction disorders). Diagnoses were obtained from discharge summaries and were defined according to the ICD-9-CM. Socioeconomic status was also used as predictor of increased expenditure and was calculated as an ecological variable linked to a basic health area and not at an individual level. It was divided in five categories (A: Very high; B: High; C: Moderate, D: Low and E: Very Low) and was created from the proportion of residents with incomes above € 100,000 (category A) and below € 18,000 (category E), standardized by age and sex. The extreme categories A and E comprised 10% of the population, while the B and D categories represented 20% of the population each.

STATISTICAL ANALYSIS

Univariate analysis: Analysis of variance (ANOVA) was used for comparisons of quantitative variables, which are presented as arithmetic mean (standard deviation); Chi-square was used for qualitative variables. We used multivariable logistic regression to identify independent predictors of increased HF-related healthcare expenditure. The variables were entered in the model one by one and retained when their significance was <0.10. To evaluate the discriminatory ability of the resulting prediction model for identifying patients with a CHF-related healthcare expenditure ≥85th percentile, we calculated the area under the receiver operating characteristic (ROC) curve (21). Statistical analyses were performed using SPSS software, version 18.0. All statistical tests and confidence intervals were constructed with a type I error level of 5%, and p-values<0.05 were considered statistically significant.

RESULTS:

Table 1 summarizes the baseline characteristics of the 88,195 HF patients included in the study. Briefly, participants were old (mean age 77.4, 68% of the population was ≥75 years), half of them female and with a high burden of comorbidities. Patients with expenditure higher than the 85th percentile were younger, more frequently male and with a higher number of comorbidities. The 30-day readmission rate for patients hospitalized due to heart failure was between 14.0% and 15.6% during the 2005-2014 periods. Seven-day readmission was around 3-4%, 90- day and 6-months readmission were 25% and 30%, respectively. One-year outcome and healthcare resource use is summarized in Table 2. All-cause mortality rate was 14%, 53% of patients had an emergency department visit and 31% needed an unplanned all-cause hospitalization. One-year primary care contact (physician or nurse) was high. Patients in the higher expenditure group had worse health outcomes.

A total of €536.2 M were spent in 2013 in the care of HF patients (7.1% of the 2013 healthcare budget), representing an average expenditure of €6,571 per patient/year. Figure 1A shows the percentiles of healthcare expenditure in the general population and in HF patients. Overall, HF was associated with a greater average healthcare expenditure compared to the general population. In the HF group, 10% of total expenditure was spent in the care of 1% of patients, whereas 54% of total spending was funnelled to 15% of HF patients. One per cent of Catalonia inhabitants consumed the 23% of total spending, and 51% of total spending was spent in the top 5% of inhabitants who consumed more. Figure 1B displays the distribution of healthcare-related expenditures in the HF group and in the general population of Catalonia. Among HF patients, the main source of expenditure was all-cause hospitalization, which accounted for 39% of the total. Twenty-two percent of the budget was spent in pharmacy and 19% in ambulatory care settings. In contrast, outpatient care and hospitalization were the main source of expenses in the general population.

Figure 1A shows the sources of healthcare-related expenditure in the HF group, stratified by age group. Although some differences in the resource use and expenditure were seen among the

different groups of age, unplanned all-cause hospitalization was the most frequent source of expenditure in all groups. In HF patients, average healthcare expenditure increased with number of comorbidities (Figure 2B). Thus, while the average expenditure per patient was €1,147/year in those with one comorbidity, expenditure increased to €16,806/year in patients with more than 9 comorbidities. Once again, the main source of expenditure was hospitalization, which increased exponentially as the number of comorbidities increased. Total medical expenditure was significantly higher in the group of patients with a HF diagnosis after a recent HF hospitalization, compared to patients with a remote HF hospitalization or with primary care setting HF diagnosis. In the latter group, hospitalization was also the main source of expenditure. In contrast, total medical cost in patients with HF diagnosed in the primary care setting was divided almost equally between out-patient care, pharmacy and hospitalization, and was, therefore, similar to expenditure of the whole Catalonia population. The remote HF diagnosis group had expenditure between the other two groups (Figure 2C).

In patients with lower healthcare resource use (those with expenditure lower than 85th percentile), expenditure was almost similarly distributed between out-patient care, pharmacy and hospitalization. In patients with the highest healthcare resource use, almost half of the expenditure was spent in hospitalization. Dialysis, skilled nursing facility use and other (mental health care, non-urgent medical transportation, home rehabilitation and domiciliary oxygen therapy) accounted for an important part of the total expense in the latter group (Figure 3). This group had a total healthcare cost that was 6-times higher (€23,065 vs. 3,597 patient/year) than patients with the lowest resource use. The predictors of high expenditure are depicted in Table 3. The presence of comorbidities, male gender, hospitalization and emergency room visits during 2012 and below-the-median socio-economic status were associated with an expenditure equal to or above 85th percentile (i.e., higher than € 10,315 euros per patient). The area under the ROC curve for identifying patients with an expenditure equal to or above 85th percentile was 0.87 (95% CI 0.803-0.812), p<0.001.

DISCUSSION

In this population-based analysis of 88,195 HF patients, hospitalization was the main source of healthcare-related expenditure, followed by medication and out-patient care. This distribution of expenditure was different from that of the general population, in which out-patient care and hospitalization were the main source of expenses. In HF patients, half of the total expenditure was used for the care of 15% of the patients. The presence of comorbidities, younger age and a recent HF and all-cause hospitalization were independently associated with a higher expenditure.

It is interesting to note that hospitalization was the main expenditure in HF patients whereas in the general population it was out-patient care and hospitalization. In a context of increasing prevalence of HF in the next decades (3), the knowledge of the distribution of healthcare-related expenditures may help guide the allocation of resources for the care of HF patients. Nowadays, HF is one of the diseases in which more money and resources are allocated (3,4). In our study, 1-year direct cost represented the 7.1% of the total yearly budget of Catalonia. This percentage is much higher than the published in other studies, in which HF cost was estimated to be 1-2% of the total budget (2). However, it must be noted that we analysed the healthcare expenditure of patients with HF, but not the expenses caused by the disease itself. Therefore, part of the calculated expense might not have been directly related to HF but be secondary to the care of other concurrent comorbidities. It is well known that health expenditure per capita is highly variable across countries. Taking into account that health expenditure per capita in Spain is close to the average value in 27 European countries (22), and assuming that HF costs vary among countries in the same proportion as total health expenditure, the HF costs reported in this study are representative of European countries. In HF patients, hospitalization accounted for the 39% of the total cost. This allocation of resources is in contrast with other studies, in which hospitalization accounted for two thirds of cost (5–9). These differences might be explained by differences in health systems, study populations and approach used for the economic analysis (7). Most of the studies were performed in patients with reduced ejection fraction (6,10–12), followed-up in cardiology or heart failure clinics (10,12,14) or with acute heart failure (9,12,13).

Hence, these studies focused on a selected group of younger HF patients in whom invasive and costly investigations and treatments are often carried out, and therefore do not reflect the whole spectrum of HF patients. On the other hand, in a small study of HF patients followed in primary care settings, the distribution of healthcare-related expenditure was similar to ours (47% in hospital care, 22% in primary healthcare, 18% in medication) (23).

Hospitalization and readmission account for the highest part of total medical costs in HF patients, and are associated with worse outcome (5,14,24,25). The greatest burden occurs within the first months after the first HF hospitalization or diagnosis (15) and patients with the longest duration of the disease have lower total costs to healthcare system in the last 6 months of life (26). This is consistent with our data. We saw that patients with a recent HF admission or an unplanned all-cause hospitalization had the highest health care resource consumption the following year. Therefore, efforts should be made to reduce hospitalization in order to improve outcome and decrease costs. The use of skilled nursing facilities or hospice (27), multidisciplinary organization of HF care including transitional interventions (19,28) and telemedicine (29) are associated with a decrease in hospitalization in patients with HF and could help decrease the expenditure associated with heart failure without worsening the prognosis.

Comorbidities were frequent in our study and associated with a stepwise increase in cost. Renal failure (13), anaemia (17), diabetes mellitus (18,30) and other comorbidities (16,26) are associated with increased cost in HF patients. Paradoxically, elderly patients had a total health care and pharmacy expenditure that was lower than that of younger patients (€5,166 in >84 years old vs. €7,782 in patients 65-74 years old). This difference was also seen in the study of Korves et al in which the cost for patients <65 years was $31,023 compared to $12,426 in patients 65 years and older (15). This might be explained by the lower use of invasive treatment, as well as a higher use of skilled nursing facilities and hospice, which are not as costly as admission to general hospitals.

HF expenditure is highly variable between patients (12). In our study we saw that 15% of patients accounted for more than 50% of the total expenditure. Lower socioeconomic status is associated with a worse prognosis in chronic HF, but information on the effect of

socioeconomic status on HF total cost is scarce. In our study, below-the-median socioeconomic status was significantly associated with expenditure higher than 85th percentile in HF patients. The observed inverse relationship between socioeconomic status and expenditure can be attributed to several factors. On the one hand, inequity in health due to economic causes could explain it: people with higher incomes may have a better health status than low-income population. On the other hand, patients might have a selective private and public resources use. Patients with dual coverage could use private coverage to have access to certain tests (and avoid the waiting lists) or buy inexpensive drugs directly without the need to have them subsidized, whereas low-income population would not be able to afford private coverage and would always use the public system.

STUDY LIMITATIONS

Patients who died during the study period were excluded from the assessment of predictors of increased expenditure. Although this exclusion could lead to bias, it is also true that the cost of these patients after their death was zero. Therefore, the inclusion of dead patients in the analysis could lead to a possible bias in the calculation of the odd ratios of risk factors and, consequently, to errors in interpretation when diseases with high mortality are analysed. For example, a particular tumour could appear as a protector factor for expenditure even though antineoplasic treatments are expensive. Regarding the possible solutions for this bias, we opted for the simplest solution and we analysed only patients alive throughout the year. This strategy has two main advantages: simplicity and robustness. In contrast with several similar strategies, each of which introduces some sort of bias, we believe it is better to use the simplest and easiest strategy to explain and understand the data. Moreover, the strength of this work is that as it is a population-based study with real data, there is no need for methodological sophistication when a simpler strategy can be used.

The use of a general population database minimized selection bias and allowed to analyse real world population (31) but the use of administrative data to identify heart failure patients may lead to HF misdiagnosis. However, studies have shown that most of HF diagnoses in administrative databases do correspond to true HF cases (32,33).

CONCLUSIONS

Heart failure is a disease that consumes a high amount of healthcare resources and expenditure. Although the main expenditure was hospitalization, its weight in the total expenditure varied depending on comorbidities, age and previous hospitalization. The knowledge of how expenditure is distributed in a non-selected HF population might allow health providers and health funding agencies to plan the distribution of resources in patients with HF.

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FIGURE LEGENDS

Figure 1. Panel A: Differences in healthcare expenditure in patients with heart failure (HF) and in the whole Catalonia population. Panel B: Health expenditure by type of resource in the general population and in heart failure patients, in millions of Euros. *Other* includes mental health services, non-urgent medical transportation, home rehabilitation and domiciliary oxygen therapy.

Figure 2: Healthcare resource use in heart failure patients by age (panel A), comorbidities (panel B) and HF diagnostic setting (panel C)

Figure 3: Healthcare resource use in heart failure patients by percentile of health expenditure. PCT: percentile.

Table 1: Baseline characteristics of the study population, overall and stratified by healthcare-related expenditure.

	Overall	Healthcare expenditure < 85th Percentile	Healthcare expenditure > 85th Percentile	p-value
n	88,195	74,832	13,363	
Age, years, mean ± SD	77.4±12.0	77.8 (12.0)	75.2(11.4)	<0.001
Female, n (%)	48,320 (54.8)	42,130 (56.3)	6,187 (46.3)	<0.001
Number of comorbidities*, mean ± SD	5.7±2.0	5.5±2.0	7.2±1.8	<0.001
Hypertension, n (%)	85,803 (97.3)	72,662 (97.1)	13,162 (98.5)	<0.001
Ischemic heart disease, n (%)	42,215 (47.9)	34,797 (46.5)	7,269 (55.4)	<0.001
Atrial fibrillation, n (%)	41,950 (47.6)	35,321 (47.2)	6,628 (49.6)	<0.001
Diabetes mellitus, n (%)	37,188 (42.2)	30,008 (40.1)	7,216 (54.0)	<0.001
Anaemia, n (%)	29429 (33.4)	22,973 (30.7)	6,428 (48.1)	<0.001
COPD, n (%)	28,612 (32.4)	22,599 (30.2)	6,000 (44.9)	<0.001
Valve heart disease, n (%)	28,263 (32.0)	23,198 (31.0)	5,091 (38.1)	<0.001
Chronic kidney disease, n (%)	25,974 (29.5)	19,830 (26.5)	6,107 (45.7)	<0.001
Depression, n (%)	23,043 (26.1)	19,307 (25.8)	3,715 (27.8)	<0.001
Cardiac conduction disorders, n (%)	19,865 (22.5)	16,089 (21.5)	3,755 (28.1)	<0.001
Cancer, n (%)	18,545 (21.0)	14,891 (19.9)	3,675 (27.5)	<0.001
Stroke, n (%)	16,127 (18.3)	13,320 (17.8)	2,806 (21.0)	<0.001
Previous myocardial infarction, n (%)	13,254 (15.0)	11,000 (14.7)	2,272 (17.0)	<0.001
Dementia, n (%)	10,257 (11.6)	9,055 (12.1)	1,216 (9.1)	<0.001
Cirrhosis, n (%)	2,416 (2.7)	1,796 (2.4)	628 (4.7)	<0.001
ESRD (in dialysis), n (%)	1,390 (1.6)	224 (0.3)	1,176 (8.8)	<0.001
HIV-AIDS, n (%)	305 (0.3)	150 (0.2)	120 (0.9)	<0.001

COPD: chronic obstructive pulmonary disease; ESRD: End-stage renal disease; HIV-AIDS: Human Immunodeficiency Virus- Acquired Immune Deficiency Syndrome; SD: standard deviation

Table 2: One-year prognosis and rates of healthcare resource use in 2013 of the study population, overall and stratified by healthcare-related expenditure.

	Overall	Healthcare expenditure < 85th Percentile	Healthcare expenditure > 85th Percentile	p-value
Cases	88,195	74,832	13,363	
Mortality rate, n (%)	12,611 (14.3)	10,027 (13.4)	2,619 (19.6)	<0.001
Patients with at least one unplanned hospital admission, n (%)	27,164 (30.8)	16,762 (22.4)	10,329 (77.3)	<0.001
Average length of hospitalization, days, mean ± SD	4.1 ± 11	2.0±9.4	16.3± 16.6	<0.001
Patients with more than one hospital admission, n (%)	10,760 (12.2)	3,592 (4.8)	7,122 (53.3)	<0.001
Patients with an emergency department visit, n (%)	47,096 (53.4)	35,321 (47.2)	11,773 (88.1)	<0.001
Patients with more than 1 emergency department visit, n (%)	26,634 (30.2)	16,912 (22.6)	9,728 (72.8)	<0.001
Out-patient specialist contact (per patient)	5.0	4.2	9.7	<0.001
Primary care contact (per patient)	22.4	19.9	36.3	<0.001
Patients who used a skilled nursing facility, n (%)	11,377 (12.9)	6,660 (8.9)	4,717 (35.3)	<0.001

SD: standard deviation

Table 3: Multivariable logistic regression analysing factors associated with expenditure higher than percentile 85.

Variables	OR (95% IC)	p-value
Gender		
Male	1 (reference)	
Female	0.843 (0.803-0.884)	<0.001
Age	0.974 (0.972-0.976)	<0.001
Group of diagnosis		
HF-hospitalization > 1 year	1 (reference)	
HF-diagnosis in PCS	0.920 (0.847-0.999)	0.047
HF-hospitalization < 1 year	1.282 (1.199-1.371)	<0.001
Morbidity		
Any comorbidity	1.522 (1.501-1.543)	<0.001
Atrial fibrillation	1.071 (1.020-1.124)	0.005
Ischemic Heart Disease	1.080 (1.030-1.133)	0.002
Valve Heart Disease	1.091 (1.038-1.147)	0.001
Diabetes mellitus	1.281 (1.222-1.343)	<0.001
Chronic Kidney Disease	1.208 (1.148-1.271)	<0.001
End-stage renal failure (in dialysis)	26.845 (22.093-32.620)	<0.001
Dementia	0.610 (0.561-0.664)	<0.001

	Cirrhosis	0.776 (0.685-0.878)	<0.001
	HIV-AIDS	2.449 (1.851-3.240)	<0.001
Hospitalization during 2012			
	0	1 (reference)	
	1	1.195 (1.116-1.279)	<0.001
	2	1.287 (1.175-1.410)	<0.001
	3	1.687 (1.491-1.909)	<0.001
	>3	2.357 (2.042-2.720)	<0.001
Emergency department visits during 2012			
	0	1 (reference)	
	1-2	1.552 (1.453-1.658)	<0.001
	3-5	2.022 (1.862-2.197)	<0.001
	>5	2.728 (2.436-3.055)	<0.001
Skilled nursing facility during 2012		0.875 (0.808-0.948)	0.001
Socio-economic status			
	Very high	0.888 (0.806-0.979)	0.017
	High	0.970 (0.909-1.035)	0.353
	Median	1 (reference)	
	Low	1.095 (1.030-1.163)	0.003

	Very low	1.123 (1.043-1.209)	0.002

HIV-AIDS: Human Immunodeficiency Virus- Acquired Immune Deficiency Syndrome

Figure 1 revised

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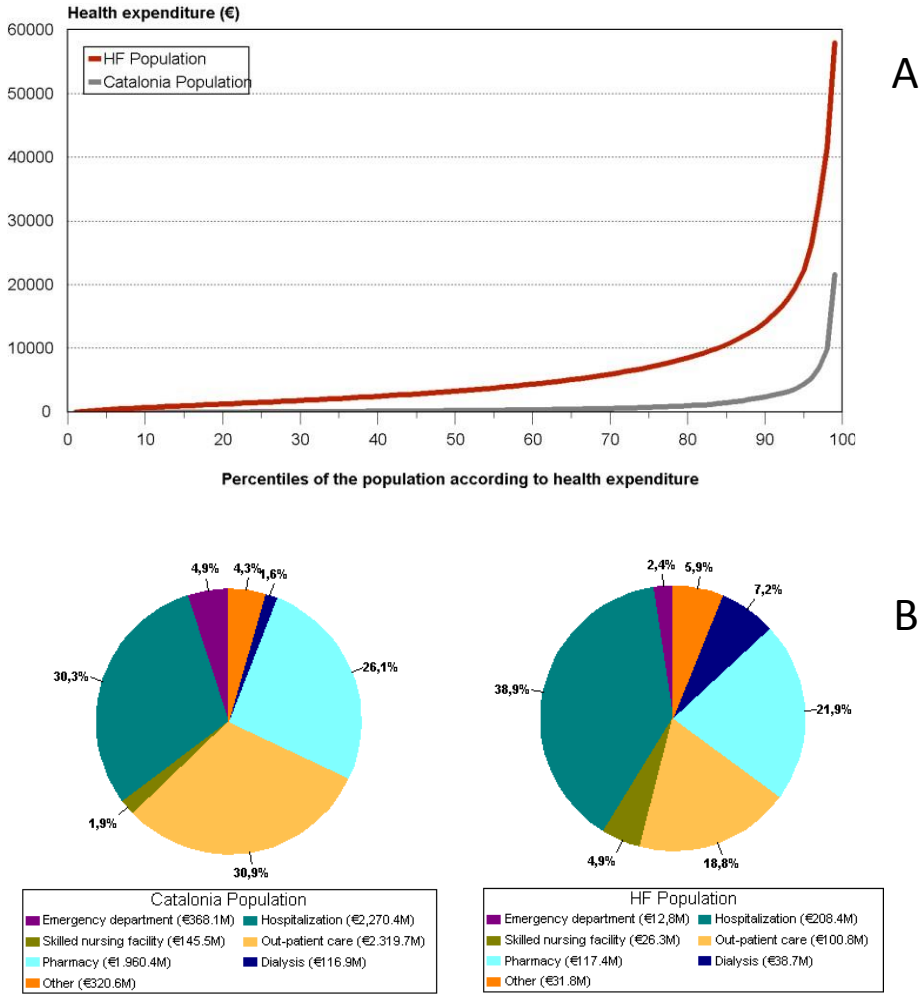

Figure 2

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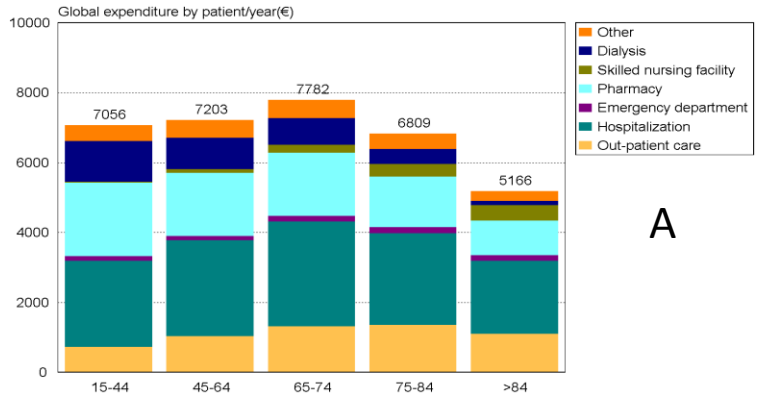

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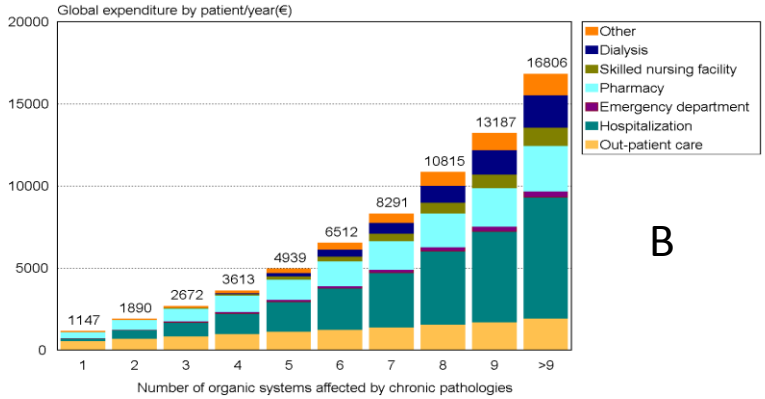

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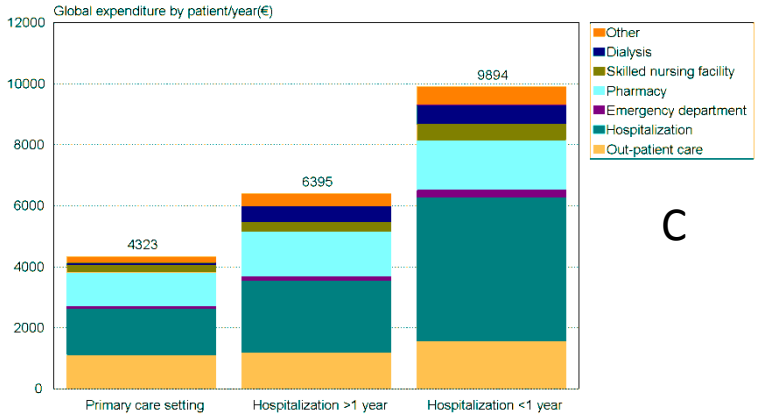

C

Figure 3

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